The Management of Local Greenhouse Gas Emissions

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Abstract

Climate change is recognised as a major threat to humanity and action is being taken at various spatial levels to reduce greenhouse gas emissions. Most efforts at the local level are focused on the development and implementation of policies to tackle climate change but there is little research on how their progress is measured. This thesis explores the progress of UK local authorities on climate change and discusses policy initiatives that can assist them to improve performance.

The research consists of three parts: firstly, a review of the relatively sparse literature regarding local greenhouse gas management; secondly, an evaluation of the UK postcode energy statistics for local carbon dioxide emissions estimates; thirdly, a survey on sustainable energy and climate policy development and implementation that explores the transfer of expertise from successful UK Beacon Councils for Sustainable Energy to less successful UK local authorities.

Climate change at the local level in the UK is a complex and fast changing policy domain with local authorities being key players. Comprehensive climate policies by local authorities can contribute towards meeting UK national and international climate change targets. Reliable emissions data are now available and longitudinal data could be used in the future to partly assess the progress of local climate change policies. Nevertheless, there are insufficient years of reliable data for a historical analysis. Few local authorities of the survey use community emissions estimates internally as a strategic driver for improving climate policies. Lack of resources and time are found to be the main barriers to action for the surveyed local authorities, and engaging with the wider community is a challenge. The findings of the research suggest that the UK local authorities can improve their effectiveness on climate change by developing: strong leadership for carbon policies, a critical mass of key staff; interdisciplinary working; integration of greenhouse gas management with other policy areas; sharing of know-how between authorities.

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Abbreviations

AFPD:	All Fields Postcode Directory
AA:	Annualized Advance
ACE:	Association for the Conservation of Energy
BV63:	Best Value 63
BaU:	Business as Usual
CO_2 eq.:	Carbon dioxide equivalent
CERT:	Carbon Emissions Reduction Target
CRC:	Carbon Reduction Commitment
CSE:	Centre for Sustainable Energy
CCP:	Cities for Climate Protection
CHP:	Combined Heat and Power
CAA:	Comprehensive Area Assessment
CLG:	Communities and Local Government
CL:	Community Leader
CSR:	Comprehensive Spending Review
DA:	Data Aggregator
dBERR:	Department for Business, Enterprise and Regulatory Reform
DECC:	Department of Energy and Climate Change
Defra:	Department for Environment, Food and Rural Affairs
DTI:	Department of Trade and Industry
DREAM:	Dynamic Regional Energy Analysis Model
ECOES:	Electricity Central Online Enquiry Service
EEC:	Energy Efficiency Commitment
ESCo:	Energy Service Company
EWP:	Energy White Paper
EMAS:	Environmental Management Audit System

EM:	Estate Manager
EAC:	Estimated Annual Consumption
EU ETS:	European Union Emission Trading Scheme
GWh:	Giga (10^6) Watt hour
GLA:	Greater London Authority
GDP:	Gross Domestic Product
HH:	Half Hourly
HGV:	Heavy Good Vehicle
HECA:	Home Energy Conservation Act
IDeA:	Improvement and Development Agency
IESD:	Institute of Energy and Sustainable Development
IPCC:	Intergovernmental Panel on Climate Change
ICLEI:	International Council for Local Environmental Initiatives
LULUCF:	Land Use, Land Use Change and Forestry
LGV:	Light Good Vehicle
LAA:	Local Area Agreement
LAU:	Local Administrative Unit
LACM:	Local Authority Carbon Management
LACORS:	Local Authorities Coordinators of Regulatory Services
LDF:	Local Development Framework
LGA:	Local Government Association
LB:	London Borough
LCCA:	London Climate Change Agency
MSF:	Manufactured Solid Fuel
MP:	Member of Parliament
MLSOA:	Middle Layer Super Output Area

MtC:	Million tonnes of Carbon
NAEI:	National Atmospheric Emission Inventory
NGT:	National Grid Transco
NI:	National Indicator
NIS:	National Indicator Set
NSPD:	National Statistics Postcode Directory
NUTS:	Nomenclature of Units for Territorial Statistics
NHH:	Non Half Hourly
ppm:	Parts per million
RA:	Regional Assembly
RDA:	Regional Development Agency
RE:	Renewable Energy
RCEP:	Royal Commission on Environmental Pollution
SP:	Service Provider
SME:	Small to medium Sized Enterprise
TRL:	Transport Research Laboratory
UK:	United Kingdom
WZL:	Warm Zones Limited

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1. Introduction

1.1 The challenge

The Intergovernmental Panel on Climate Change (IPCC) in its Fourth Assessment Report 'Climate Change 2007' states that warming of the climate system is unequivocal due to evidence from observations of increased global average air and ocean temperatures (IPCC 2007a). Since 1850, when 'record taking' began, the years from the mid-1990s to the mid-2000s have been among the warmest years in terms of global surface temperature (IPCC 2007a). Global atmospheric concentration of carbon dioxide (CO_2) which is the most important greenhouse gas, was 379 parts per million (ppm)[1] in 2005. The annual growth rate of CO_2 concentration in the atmosphere was 1.9ppm in the period from 1995 to 2005 (IPCC 2007b). The IPCC climate stabilisation scenario requires a CO_2 concentration of no more than 400ppm by 2050, or a CO_2 equivalent (eq.) concentration including the six greenhouse gases and aerosols of no more than 490ppm, in order to limit global average temperature increase to between 2 and 2.4° C from pre-industrial level (IPCC 2007a). Byrne, Kurdgelashvili, and Hughes (2008) propose the threshold of 450ppm of CO_2 eq. concentration to prevent climate destabilisation. The Stern Review on the Economics of Climate Change indicates that CO_2 eq. emissions must be nearly 85% below business as usual emissions by 2050 (Stern 2006).

The international community was motivated during the 1990s to address the threat of climate change and the United Nations Framework Convention on Climate Change took place in 1992. The European Union (EU) had a significant role in these international negotiations through its 1990 declaration to stabilise CO_2 emissions in 2000 at the 1990 level (Dessai and Michaelowa 2001). The most important result of international negotiations on climate change was the agreement of the Kyoto Protocol in 1997. The Kyoto Protocol requires industrialised countries to reduce the overall emissions of the six main greenhouse gases by an average of 5.2% below 1990 levels between 2008 and 2012. The UK has a commitment to reduce emissions by 12.5% (Johnston, Lowe, and Bell 2005).

In the UK the need for deep cuts in greenhouse gas emissions has been expressed in the Energy White Paper issued by the former Department of Trade and Industry (DTI)

[1] Parts per million refers to how many greenhouse gas molecules are included in a million molecules of dry air in the atmosphere (IPCC 2007b).

in 2003. The Government referred to the necessity for a 60% reduction of CO_2 emissions from *current* levels by 2050, along with significant progress towards this target by 2020 (DTI 2003a). In November 2007, Gordon Brown MP announced that Britain is prepared to introduce the target of a 60% reduction in CO_2 emissions by 2050 (Watt 2007). Finally, the UK Climate Change Act was passed on 26th November 2008 that introduces a legal national target of *at least* 80% *greenhouse gases* (instead of CO_2 as proposed in the Bill) reductions by 2050 from a 1990 baseline[2] with an interim target in 2020. The baseline is the net CO_2 emissions in 1990 plus the net emissions of the other greenhouse gases in the year that is used as their baseline (Office of Public Sector Information 2008a).

The Stern Review on the Economics of Climate Change concluded that inaction will cost more than mitigating climate change and suggests that action should be taken now. Using the results from formal economic models, it estimated that if action is not taken now the overall cost of climate change will be equivalent to losing at least 5% of global Gross Domestic Product (GDP) each year. If a wider range of risks and impacts is taken into account, the damage could rise to 20% of GDP or more. In contrast, the cost of action to reduce emissions of greenhouse gases to avoid the worst impacts of climate change can be decreased to around 1% of global GDP each year (Stern 2006).

Climate change mitigation policy is traditionally considered to take place mostly in an international and national context; nevertheless, various policy bodies and documents acknowledge the significant role of local authorities in this effort. For example, there is a growing concern that local to regional scale actions are needed in order to bring an extensive carbon emissions reduction, but to date, most efforts have been concentrated on a national scale in the UK. According to the Low Carbon Spaces scoping study for the UK Sustainable Development Commission, there is a large untapped potential for carbon reduction at the local to regional level that can bring multiple social, economic and environmental benefits (Shackley, Fleming and Bulkeley 2002).

[2] Initially the Central Government included a 60% reduction target for CO_2 emissions by 2050 but various bodies stated the need for stringent targets. For example, the UK Institute for Public Policy Research made the policy recommendation in 2007 that the UK should adopt a binding target of at least 80% reduction of CO_2 emissions by 2050 (from 1990 levels) with proper transitional targets through a process of an open and full public debate (Lockwood et al. 2007).

The significant role for local authorities in the UK was also acknowledged in the Energy White Papers of 2003 (DTI 2003a) and 2007 (DTI 2007), the UK Climate Change Programme of 2006 (Defra 2006) and at European and international level by the European Commission's Green Paper on 'Energy Efficiency or Doing More with Less' (European Union 2005) and the Organisation's for Economic Co-operation and Development (OECD) 'Urban Energy Management-Good Local Practice' document (OECD 1995).

Bulkeley and Betsill (2003) suggest that national states will not be able to meet their international commitments for tackling climate change without local action. The Climate Change Commission of the UK Local Government Association (LGA Climate Change Commission) supports the view that local government is an important sector in climate change mitigation due to its democratic mandate for action. Citizens often trust local government more than Central Government[3], and the former has a leadership role to work in partnership with public and private bodies (LGA Climate Change Commission 2007a). Finally, the UK Centre for Sustainable Energy (CSE), in its report 'Council action to curb climate change' supports the view that the implementation of measures to reduce emissions is highly diffused because it takes place at the local level with the decision and action of householders, transport users, and businesses (Centre for Sustainable Energy 2007). Thus, local authorities have a key role to play in addressing the international issue of achieving deep (greater than 80%) cuts in greenhouse gas emissions (Centre for Sustainable Energy 2007).

[3] Throughout the thesis, the term 'Government' refers to Central Government.

1.2 Aim of the study

The aim of the research is to identify how UK local authorities can evaluate the effectiveness of their policies, and discuss strategic and policy issues that could assist them to improve their performance on sustainable energy and climate change mitigation.

1.3 Objectives of the study

This study has the following objectives:

- To assess whether the UK energy consumption data collected by utilities at local authority level can be used for evaluating carbon reduction policies at the local level. The spatial level which is explored is the whole geographical area (community level) administered by a local authority.
- To define the baseline position of local authorities on sustainable energy, the relevant policy drivers and the legislative powers and voluntary instruments available for action.
- To identify the strategic issues on local climate policy that will assist UK local authorities to manage local greenhouse gas emissions.

1.4 Overview of the research and structure of the thesis

This research project started in September 2004 shortly after the Energy White Paper (EWP) 2003 had been introduced (DTI 2003a). The serious intention of the UK Government to reduce greenhouse gas emissions which is evident in the EWP 2003 is also apparent from the adoption of legislative binding targets to reduce greenhouse gas emissions in the UK Climate Change Act 2008 (Office of Public Sector Information 2008a). As decisions on energy consumption that contribute to climate change are taken at the local level, local authorities have a significant role in climate change mitigation as managers of their estates, service providers and community leaders (LGA Climate Change Commission 2007a).

There are three main parts in the thesis:

1. a review of the UK energy policy regime that influences action by UK local authorities.
2. an analysis of the data available for measuring progress in managing greenhouse gas emissions at the local level in the UK.

3. a survey of a sample of UK local authorities on sustainable energy and climate change policy to establish their relevant baseline position and produce policy recommendations that can develop/enhance their performance on energy and climate policy.

Chapter 1 is the introductory chapter that explains the rationale for tackling climate change at the local level and sets the context of the research describing its three parts. Chapter 2 describes the methodology of the research. Chapter 3 analyzes the changing energy policy regime that is related to action by local authorities in the UK and reviews studies that have assessed the performance of UK local authorities on climate change mitigation. Gaps in the literature are identified that give the opportunity for a new case-study. Chapter 4 discusses the availability and accuracy of energy consumption data at the local level in the UK as well as of previous studies on local CO_2 calculations that made use of these data. Chapter 5 describes the case-study of a sample of twenty UK local authorities, where less successful authorities received expertise on sustainable energy from successful authorities. The survey assessed the baseline position of the less successful authorities and evaluated the effectiveness of the mentoring scheme of expertise transfer. Chapter 6 presents the findings of the case-study. Chapter 7 presents the overall conclusions of the research in four parts:

- the energy policy context related to the local level in the UK.
- the effectiveness of UK local greenhouse gas emissions data on evaluating the progress of climate change policies.
- the results of the case-study of the twenty UK local authorities.
- policy recommendations on how UK local authorities can improve their effectiveness on sustainable energy and climate change.

2. Research methodology

2.1 Introduction

This chapter describes the research methodology that was applied in each of the three parts of the thesis. The thesis adopts a mixed quantitative and qualitative approach in measuring progress and proposing policy recommendations that could improve the performance of UK local authorities. The following paragraphs summarise the rationale behind the chosen methodology. More detailed information based on references is provided in the following sections of this Chapter. The Chapter concludes with a flow chart that shows schematically the research methodology approach.

The literature review on the management of local greenhouse gas emissions sets the scene of this thesis and provides useful background on the policy regime in which UK local authorities develop and implement climate policies. The discussion on the policy and legislative drivers that are at the disposal of the UK local authorities is linked to the case-study of this thesis: in the literature review the reader gets a broad view of parameters that influence the barriers and key success factors on managing local greenhouse gas emissions; in the case-study the barriers and key success factors of the authorities on tackling climate change are explored. Therefore, the reader can make links between the policy regime and the policy findings of the case-study.

Measuring the progress of local authorities on managing emissions is an integral part of their carbon management policies and the energy related carbon dioxide emissions account for the bulk of the greenhouse gas emissions in the UK. Thus, the metric of energy-related carbon dioxide is explored in this thesis as a means of tracking the progress of UK local authorities to combat climate change. The energy sources considered are gas and electricity together with road transport because their statistics are associated with a significantly lower degree of uncertainty compared to the remaining energy consumption at the local level (for example coal, oil household consumption). In this thesis, the availability and reliability of the energy and associated emissions data is assessed and whether they allow a meaningful comparison of year on year carbon dioxide emissions for UK local authorities. Future issues regarding the use of the data from the authorities are also highlighted.

As an objective of this thesis is to explore key strategic and policy issues regarding the local greenhouse gas management, a qualitative analysis is also carried out. This

includes barriers and key success factors that influence the ability of the authorities to take action. This thesis does not attempt an in-depth study of climate policy factors, but rather has the character of a scoping study which discusses key issues and reaches a conclusion on broad strategic policy recommendations. In the thesis, the benchmarking position of the studied authorities was assessed. The authorities self-assessed qualitatively their current performance on sustainable energy based on the Sustainable Energy Benchmarking Matrix that was developed specifically for the case-study. These data were analysed by the researcher; however as explained in the thesis, the quantitative metric of carbon dioxide emissions was not used to benchmark the authorities because there are insufficient years of reliable data. It is envisaged that the thesis could be used by other researchers as a study that can highlight areas for future detailed and in-depth research.

The main resource that was used in the case-study by the authorities was the Sustainable Energy Toolkit prepared by the beacon councils for sustainable energy who mentored the case-studied authorities. The Sustainable Energy Benchmarking Matrix is part of the Toolkit. There are three distinct roles on sustainable energy for the participating authorities, which are: a. Estate Managers; b. Service Providers; c. Community Leaders. This categorization is the one used in the Toolkit and it is explained in Chapter 5 of this thesis. The Toolkit divides the local climate policy into two broad areas. The first is the setting of relevant processes to prepare the ground for developing projects, and the second is the implementation of policies and measures. Again these parts are explained in Chapter 5. The thesis adopted this ‘toolkit’ framework on the roles and broad areas of climate policy.

This thesis draws its qualitative data from a case-study of expertise transfer on sustainable energy between authorities, which was organised by the IDeA. The case-study was evaluated by the researcher and a relevant report on behalf of IDeA was produced. The IDeA is a key national institutional body responsible for improving the performance of UK local authorities. Thus, the researcher found the opportunity to fulfil objectives of the thesis via a case-study arranged by a governmental agency responsible for working with local authorities. It was thought that this feature would add value to the quality of this thesis.

The data of the case-study were collected through postal questionnaires and telephone interviews. The researcher designed the survey, helped with the recording of the telephone interview responses (the interviews were carried out by Dr. Zoe Fleming) and analysed the data. He also contributed to the relevant evaluation report that was prepared by IESD on behalf of IDeA. The number of authorities and which authorities would participate in the case-study was determined by the IDeA. The case-study had a pilot nature, thus twenty authorities were selected. The researcher contacted Dr. Katherine Irvine and Dr. Rob Wall[4] who are social scientists on energy and environmental topics with experience in quantitative and qualitative research. Both research fellows advised the researcher that advanced statistical analysis is not meaningful because the size of the sample (twenty authorities) is too small for such an approach. As the total number of UK local authorities is around 450, it was suggested by the Research Fellows that at least 50 local authorities should be included in the sample in order to test the statistical significance of the findings. For that reason, descriptive statistics based on mean values are applied in the data analysis. In addition, the IDeA had specific deadlines concerning the completion of the evaluation work, therefore extended data collection and subsequent analysis would require time beyond the deadline of the project. As a result, the data collected were straightforward and simple. This feature allowed for a critical synthesis of the responses where the views of the respondents were summarised. However, advanced methods of data analysis like the coding of responses was not applied. This is because the straightforward nature of the responses is not compatible with the method of coding.

The quantitative part of the research which is based on the metric of carbon dioxide emissions and the qualitative analysis which is based on the case-study are linked by looking at the carbon dioxide emissions of the local authorities of the case-study. The emissions data used are those for 2005, 2006 and 2007. The case-study was carried out between December 2006 to May 2007, so it would be valuable to explore whether the data before and after the case-study highlight any interesting differences.

Sections 2.2, 2.3 and 2.4 which follow describe the three parts of the research which are: a. the literature review; b. measuring the progress of UK local authorities on climate change based on the UK local energy statistics; c. the case-study of a sample

[4] Dr. Rob Wall is no longer a core member of the Institute of Energy and Sustainable Development.

of twenty UK local authorities on the transfer of expertise on sustainable energy and climate change policy.

The data collected in the case-study were through:

- a benchmarking analysis of the baseline position of the less successful authorities based on their self assessment scores in the Sustainable Energy Matrix of the toolkit**.** Energy and emissions data at the local level described in Chapter 4 have not been used as a means to benchmark the local authorities on climate policy for two reasons: a. there are insufficient years of reliable data for such an analysis (only data for 2005, 2006 and 2007 have received the National Statistics Status); b. Each authority has its own circumstances which strongly affect its ability to act on climate change. As a result, Defra suggests that a comparison between individual authorities is not advisable (Defra 2008b).
- postal questionnaires sent to all authorities
- telephone interviews with all authorities

The initial approach on the case-study was to send out postal questionnaires in January 2007 and again in April 2007 and assess the changes in the performance of authorities between the beginning and end of the mentoring period. These questionnaires would survey the baseline position of the participating authorities including the beacons (only initial baseline position would be needed for beacons). This baseline survey would complement the benchmarking of the authorities through the Sustainable Energy Matrix of the toolkit by drawing additional information. However, the IDeA decided in a steering meeting on 7th February 2007 that the baseline position would be assessed only for the less successful authorities through the matrix of the toolkit and that only one questionnaire would be delivered to each authority (including beacons) to test the effectiveness of the scheme. As a result, three different questionnaires were produced for each type of authority (mentor, mentee, stand-alone) to reflect their different role in the scheme. To obtain data on issues not covered or being covered thinly in the postal questionnaires, telephone interviews were conducted with all twenty authorities (tailored according to their role in the scheme).

The chosen questions for both postal and interview surveys were relatively simple and answers were short and simple. Comments on the clarity and content of the postal questionnaires were given by involved personnel of beacon councils in the case-study.

The comments were received at an IDeA's steering meeting that took place in February 2007. The telephone interviews were conducted by Dr. Zoe Fleming and the researcher helped with the manual recording of the answers (typed on paper). The data collected from the postal questionnaires and telephone interviews covered strategic and policy topics on local energy and climate change. The analysis of the mentoring scheme was to inform about modifications in the content of the toolkit, before it was launched nationally in July 2007. This means that the toolkit would be sent to all UK local authorities by July 2007; however a roll-out of the mentoring scheme at national level was still being debated during the scheme. As a result, the (MPhil) researcher had to compromise the degree of volume and detail of data collection to deliver the IDeA's project objective in due time. The data from the postal and telephone surveys were collected in April and May 2007.

2.2 Review of the literature

The energy policy regime that influences action at the local level in the UK is reviewed including legislation, guidance and powers available to local authorities to manage greenhouse gas emissions. Academic papers and reports as well as governmental and non-governmental sources were used in this review. Additional information on mechanisms to deliver sustainable energy development at the local level is presented in the Appendices.

2.3 Measuring greenhouse gas emissions

The measurement of greenhouse gas emissions can evaluate the progress of climate change policies at the local level since it shows whether the local authority is on track to meet its emissions targets. This approach has been endorsed internationally since the 1990's. For example, ICLEI's Cities for Climate Protection (CCP) programme was launched in 1993 and a milestone for the participating cities is the quantification of greenhouse gas emissions at community scale (Droege 2006). Also, a national version of CCP was established in England and Wales in July 2000 (Shackley, Fleming and Bulkeley 2002). The need for creation of an emissions inventory at city wide scale is also the first action that is proposed for managing local greenhouse gas emissions in the United States Mayors Climate Protection Agreement adopted in 2005 (Linstroth and Bell 2007).

However, little research has been undertaken in measuring the progress of climate change policies at the local level while most analysis is devoted to policy development and implementation. For the above reasons, the first objective of this research is to measure the progress of UK local authorities in climate change mitigation based on the metric of energy-related CO_2 emissions. Measuring progress is a milestone in climate change mitigation as it shows whether the local authority is achieving its emission targets, thus dictating whether there is a need for policy changes. CO_2 emissions contributed to nearly 85% of UK total greenhouse gas emissions in 2006 and the bulk of these CO_2 emissions are due to the burning of fossil fuels (Defra 2008a). Gas, electricity and road transport account for around 80% of total energy consumption of UK local authorities, and data on the consumption of other fuels which make up the remaining 20% (like for instance use of coal and oil at household level) are associated with a very high degree of uncertainty (dBERR 2007a). Thus, this thesis is focused on the energy-related CO_2 emissions from gas, electricity and road transport.

The following methodology was applied to measure quantitatively the progress of UK local authorities in combating climate change:

- Review of availability of the local energy consumption data regarding gas, electricity and road transport.
- Review of accuracy of this energy consumption data.
- Assessment whether the available data are accurate and sufficient enough in number of years to produce comparable CO_2 emissions for each authority for a sample of UK local authorities. Comparison across local authorities is not considered as each local authority has its own circumstances that affect its ability to take action (Defra 2008b).

2.4 Case-study of a sample of twenty UK local authorities

The LGA suggests that barriers identified in performance at the local level should be used to enlighten the work of local authorities on sustainable energy and climate change mitigation (LGA, IDeA and Energy Saving Trust 2004). Various best examples of case studies and recommendations are available to UK local authorities like the Nottingham Declaration on Climate Change Action Pack[5] (Energy Saving Trust 2008a)

[5] The signing of the Nottingham Declaration on Climate Change is a voluntary initiative which requires the Leader and Chief Executive of the authority to commit against climate change and work with partners to deliver emissions reductions. This is envisaged to add credibility to action from local authorities against climate change (Energy Saving Trust 2008a).

and resources from the Energy Saving Trust (Energy Saving Trust 2008b). Also, measuring progress quantitatively should be assessed within the context of the capacity of each local authority to act because the latter should be a core component if fair and achievable emission targets are to be set for the authority. Thus, it is vital to focus on qualitative issues like barriers and key issues that can assist to improve performance. In this context, the second aim of this research is to provide policy recommendation on key strategic and policy issues for UK local authorities that can assist them in improving their energy and climate change performance. This objective is examined through:

- analyzing their baseline position
- identifying barriers that constrain performance improvement
- proposing key strategic and policy recommendations to strengthen the capacity of the authorities to act

During this thesis, the UK Improvement and Development Agency for local government[6] (IDeA) organised a mentoring scheme of knowledge transfer between successful (beacon councils for Sustainable Energy) and less successful authorities in sustainable energy development. For the requirements of the scheme, a Sustainable Energy Toolkit was produced by the seven beacon councils with support from the former DTI, the Department for Environment Food and Rural Affairs (Defra), IDeA, the Department of Communities and Local Government (CLG), Marches Energy Agency and CAG Consultancy.

Each beacon council (mentor) mentored a less successful authority (mentee) while at the same time six stand-alone less successful authorities used the toolkit without external support. The Sustainable Energy Matrix of the toolkit was used to assess the baseline position of the less successful authorities.

[6] IDeA has the aim to assist local authorities in improving the quality of life of their citizens (IDeA 2007a)

The participating local authorities are summarised in table 1 and those mentored are noted.

Table 1: Local authorities involved in the case-study

Successful Authorities (Beacons)	Less Successful Authorities
Leicester City Council	Cambridgeshire County Council - **mentored**
London Borough of Lewisham	Gloucestershire County Council - **mentored**
High Peak Borough Council	London Borough of Kensington & Chelsea - **mentored**
Woking Borough Council	Macclesfield Borough Council - **mentored**
Cornwall County Council	Newark and Sherwood District Council - **mentored**
Nottinghamshire County	South Shropshire District Council - **mentored**
Shropshire County Council	Three Rivers District Council - **mentored**
	Northampton Borough Council
	Hinckley & Bosworth Borough Council
	Tameside Metropolitan Council (Unitary)
	Broxtowe Borough Council
	Gloucester City Council
	Stroud District Council

The Institute of Energy and Sustainable Development (IESD) at De Montfort University was commissioned by the IDeA to evaluate the effectiveness of the toolkit and the mentoring process and explore the baseline position of the participating local authorities. This provided an opportunity to administer a survey to a range of local authorities. Section 2.5 concludes with the research flow chart.

2.5. Flow chart of the research methodology

3. The Energy Policy Context for Local Authorities in the UK

3.1 Actions taken by UK local authorities on climate change mitigation

The information in this section aims to reveal where opportunities for emissions reductions exist under the sphere of activity of local authorities in the UK. Since 2000 the role of the local authorities has been slowly evolving to include characteristics beyond service provision. The Local Government Act 2000 introduced the Power of Well Being which enables local authorities to undertake any activity not restricted by legislation if it intends to improve the economic, social, and environmental well being as part of or for the totality of the local area. The Office of the Deputy Prime Minister announced the first round of Local Area Agreements (LAAs) in 2005. The main objective of LAAs is to deliver sustainable communities to local people through better outcomes (see Appendix 1 for more information on LAAs) (Wade et al. 2007). The authority is the lead partner of the Local Strategic Partnership that delivers the LAA. The Local Government and Public Involvement in Health Act 2007 places a statutory duty on local authorities to prepare a LAA (IDeA 2008).

The publication of the Local Government White Paper, Strong and Prosperous Communities, in October 2006, helped reinforce the community leadership role for local authorities. The Local Government White Paper aims to limit the immense command and control approach of the Central Government in relation to the administration of Local Government while it specifies that climate change should be an important topic in the Local Government politics and practices. Thus, some local authorities have widened their role on climate change mitigation during recent years and include the community leadership dimension (Wade et al. 2007). Local authorities in the UK provide various services that have an impact on CO_2 emissions as table 2 shows (LGA Climate Change Commission 2007b):

Table 2: Service Delivery Actions by UK Local Authorities on Climate Change Mitigation	
Service Delivery	**Action**
Planning	Local Development Frameworks sustainability appraisals Public Policy Statements (PPSs) Code for Sustainable Homes
Building control	Enforcement of Part L of Building Regulations that regulates energy and carbon dioxide performance of new domestic and non-domestic buildings and those undergoing refurbishment
Housing	Home Energy Conservation Act (HECA) 1995, Decent Homes Standards, Fuel poverty, Energy Performance Certificates for marketed and rented housing
Transport	Public transport, Low/no carbon transport (for example biofuels, walking-cycling), employee green travel plans
Waste and Environmental Services	Reducing waste, recycling and waste to energy schemes, air quality strategies
Education	Education activities to the pupil and wider community

Finally, local authorities manage their own buildings, housing stock, personnel activities, procurement services, and equipment (Centre for Sustainable Energy 2007).

3.2 Potential for carbon dioxide emissions reductions by UK local authorities

Typical annual greenhouse gas emissions from different types of UK authorities at internal (own buildings) and community level are shown in the following table 3 as CO_2 eq.:

Table 3: Typical Greenhouse Gas Emissions at Internal and Community Level in UK Local Authorities		
Local Authority Type	**CO_2 eq. emissions (tonnes per year)**	
	Internal (own buildings) level	Community level
County Councils	30,000	10,000,000
Unitary Authorities, London Boroughs, Metropolitan Boroughs	30,000	1,000,000
District Authorities	3,000	300,000

Source: Allman and Fleming (2003)

The data show that annual emissions from the whole community could be higher compared to internal emissions from buildings by a factor of around 30, 100 or 300

times for Unitary Authorities/London Boroughs/Metropolitan Boroughs; District Authorities; and County Councils respectively. Thus, it is the community role of the local authority that is of most importance for climate change mitigation. Strong action by UK local authorities could achieve 150 million tonnes of CO_2 reduction a year contributing to the national target of a 26-32 percent reduction in CO_2 emissions by 2020 from 1990 levels that is contained in the UK Climate Change Bill (LGA Climate Change Commission 2007a). The total greenhouse gas emissions in 2006 reached 652.3 million tonnes of CO_2 eq., a decrease from 2005 levels of 0.5%. CO_2 accounted for about 85% of the total greenhouse gas emissions (CO_2 eq.) and stayed almost the same (Aldred 2008). At corporate (internal) level, if local authorities had carbon neutral buildings and vehicle fleets, they could save 5.5 million tonnes of CO_2 every year (LGA Climate Change Commission 2007a).

3.3 The co-benefits of climate change mitigation at the local level

Climate change mitigation at the local level is associated with various co-benefits besides greenhouse gas emissions reductions. Kousky C. and Schneider S. (2003) suggest that the co-benefits of climate change mitigation can localize climate issue for citizens thereby justifying climate policy to the public and the expense of spending public money by providing an opportunity to address multiple issues simultaneously. There are health benefits to UK citizens associated with tackling climate change. For example, fuel poverty which is related to winter deaths can be addressed through climate change policies. Nearly 5 million people suffer from fuel poverty nowadays in Britain (LGA 2008a). However, local authorities are not required explicitly to tackle fuel poverty. As a result, only little good practice can be identified in Local Government action (Roberts and Baker 2006).

On the social policy side, the energy efficiency work on the Newark and Sherwood District Council housing is estimated to have created 639 job years locally (Friends of the Earth 1996) and LGA reports that up to 35,000 jobs could be sustained in the UK by 2020 from renewable energy exploitation (LGA 2005). Economic benefits due to higher energy efficiency can reduce energy consumption in the home. An average householder in the UK is estimated to pay around £1,400 for gas and electricity in 2008 (LGA 2008a) while the cost was £572 in 2003 (LGA 2008b). Energy improvements in housing increase the performance of students, local cohesion is achieved through local

energy conservation and renewable energy measures, traffic is reduced, and streets are safer (LGA 2005).

3.4 Main policy drivers

This section describes two important policy drivers that drive action at the local level. These are the Energy White Paper 2003 and the UK Climate Change Programme 2006.

3.4.1 Energy White Paper 2003

By 2000, the energy policy debate in the UK was focused on how to combine competitive energy prices to customers with energy security and climate change mitigation policies. As a result, an Energy Review was set up by the Cabinet Office Performance and Innovation Unit (renamed now to Strategy Unit). A final report was produced in February 2002 after extensive consultation in 2001. The Energy Review recommended that environmental sustainability should take priority over the objectives of securely and competitively priced energy supplies. After the release of the Energy Review there was another year of consultation that led to the publication of the Energy White Paper (EWP) in February 2003 (Foxon and Pearson 2007).

The EWP has as one of the four pillars of the UK energy policy, the reduction of the CO_2 emissions by 60% below 2003 levels by 2050 (the EWP uses the expression of *current levels* in its text). The EWP recognises that a significant reduction in emissions is dependent upon a number of factors such as renewable energies, energy efficiency, CHP, breakthrough and clean coal technologies (Kelly 2006). The EWP introduces a long-term commitment to CO_2 emissions reductions. This was a new feature of the Governmental energy policy[7]. The goal of 60% reduction for CO_2 emissions was adopted after a suggestion by the Royal Commission on Environmental Pollution (RCEP) in its 22nd report, Energy - the Changing Climate. The EWP supports an interim target of emissions reductions of between 15-25 MtC to be achieved by 2020. The main contribution could come from energy efficiency measures in households (4-6MtC) (Foxon and Pearce 2007). Using the conversion factor of 1 $MtCO_2$ equals 3.16 MtC (Defra 2007a) these figures are converted into emission reductions of 47.4-91.8$MtCO_2$ eq., with potential reductions from domestic energy efficiency at 14.7-22$MtCO_2$ eq.

[7] Since December 2007, Defra instructs that government documents should refer to CO_2 eq. rather than carbon eq (Defra 2007a).

The other three goals of the EWP are (Foxon and Pearson 2007):

- Security of energy supplies
- Achieve reduced energy prices to increase business competitiveness
- Combating fuel poverty

In 2007 the Energy White Paper 'Meeting the Energy Challenge' was issued by DTI. Both EWPs put emphasis on the role of local authorities in sustainable energy (DTI 2003a, 2007). Additionally, comprehensive strategies at the local level can contribute to achieving objectives of both EWPs. Hence, there is compatibility between action at the local level and wide sustainable energy policy aims of the Government.

3.4.2 UK Climate Change Programme 2006

The revised UK Climate Change Programme 2006 (Defra 2006) confirms the commitment of the Government to achieve its carbon reduction target and describes integrated action at all levels from transport and energy supply to Local Government and individuals. The main measures for the Local Government are:

- A new funding of £4million for a local authority best practice support and improvement programme launched in 2006-07. The aim was to motivate more authorities to improve their performance.
- A new revolving loan fund of £20million to finance investment by the public sector in energy efficiency. At least 20 local authorities received support in 2006-07.

It is estimated that the new measures for the public sector, where local authorities are placed, will contribute an additional 1.1MtCO_2 of CO_2 eq. savings in 2010. For comparison, UK emissions of the six greenhouse gases were 767MtCO_2 eq. in 1990 (Defra 2006). The Programme has many other measures that rely to some degree on delivery from local authorities. The degree of delivery by local authorities is not linearly correlated to the potential carbon reduction. For example, the enforcement of the Buildings Regulations in the domestic sector is principally the responsibility of local authorities but there is no wide difference in carbon emissions between one house that passes Part L of the regulation and another that fails (CSE 2007). On the contrary, there are other measures where a local authority is not so heavily involved but the potential for emissions reductions is higher. One of such measures is the sign posting of householders towards grant schemes and energy efficiency suppliers' activities. The total estimated influence of local authorities in the carbon savings of the UK Climate

Change Programme 2006 by 2010 for all eight categories of the measures is 7.5% or 6.6MtCO_2 eq. (CSE 2007).

3.5. The regulatory regime at the local level

This section gives information on the regulation that applies to the role of UK local authorities to manage energy consumption and greenhouse gas emissions.

3.5.1 Past regulation

The first regulatory intervention that was introduced at the local level was the Home Energy Conservation Act 1995 (private members Bill). This Act requires local authorities with responsibilities (Energy Conservation Authorities) in social housing to prepare and publish a report with practicable and cost effective residential energy efficiency measures. The goal is for 30% improvements to be achieved over ten to fifteen years (Jones and Leach 2000). Defra reports that local authorities showed an average improvement in domestic energy efficiency from 1st April 1996 to 31st March 2006 of 19.3% under HECA. The figure is estimated from data reported by the Energy Conservation Authorities (Defra 2007b).

Local authorities are responsible for the implementation of Part L of Building Regulations that refers to Fuel and Energy Conservation (LGA Climate Change Commission 2007b). The latest version came into force on 6th of April 2006 and requires the reduction of CO_2 emissions by 20% in new domestic buildings less than 2002 Part L Building Regulations in England and Wales (Office of the Deputy Prime Minister 2006a). When existing domestic buildings undergo refurbishments, they are not required to achieve specific reductions in CO_2 emissions but rather to increase energy performance (Office of the Deputy Prime Minister 2006b). From 1st April 2000 the duty of 'best value' took effect in England and Wales. One 'best value' performance indicator exists for local authorities relating to energy efficiency (Allman, Fleming and Wallace 2004):

- BV63 which relates to the Government's Standard Assessment Procedure (SAP) ratings of local authority housing, requiring the average SAP ratings to be reported together with the annual change.

Local authorities are also advisory bodies in England and Wales for the preparation of fuel poverty strategies under the Energy Conservation Act 2000 (Office of Public Sector Information 2006a). The Transport Act 2000 gives powers to local authorities to

implement road user charging and workplace parking levies. Under the Traffic Regulation Order local authorities can also introduce High Occupancy Vehicle lanes for vehicles transporting two or more people (LGA 2008c).

3.5.2 Recent regulation

The Climate Change and Sustainable Energy Act 2006 was introduced as a private members Bill and received Royal Assent on 21st June 2006. The Act puts a duty on local authorities when they exercise their functions to take into account a report published by the Secretary of State on ways in which they could improve energy efficiency, increase levels of micro-generation, reduce greenhouse gas emissions and eradicate fuel poverty (Office of Public Sector Information 2006b). The LGA Climate Change Commission supports that this obligation could be part of an assessment on climate change mitigation undertaken by the Audit Commission (LGA Climate Change Commission 2007a).

The UK Climate Change Act 2008 includes a legally binding target for the reduction of national greenhouse gas emissions by *at least* 80% by 2050 with an interim target in 2020. The baseline year is specific for each greenhouse gas and for CO_2 it is 1990. The Act does not allocate carbon budgets to particular sectors (Office of Public Sector Information 2008a), although such an arrangement could follow in the future (Defra 2008c). Thus, sectors of society are not given specific requirements to reduce emissions by a specific percent. The LGA Climate Change Commission has stated that the national targets of the (then) Bill should be considered as a material consideration in planning law (LGA Climate Change Commission 2007a).

The Carbon Reduction Commitment (CRC) applies mandatory emissions trading to cut carbon emissions from large energy users in the commercial and public sector. The scheme involves players with a half hourly metered electricity consumption higher than 6,000 MWh from 1st January 2008 to 31st December 2008 (Defra 2008d). The scheme is expected to come into effect on April 2010 (Defra 2008e). It is estimated that around the 100 largest authorities will participate (LGA Climate Change Commission 2007a). The Planning Bill 2007/08 imposes a new duty on local authorities to take into consideration climate change mitigation and adaptation when they form Local Development Documents (LGA 2008c).

The Planning and Energy Act 2008 gives to local authorities the power to *reasonably* require that new developments in their areas have a percentage of their on-site needs satisfied by renewable energy sources (Office of Public Sector Information 2008b). Merton Borough Council was the first Council to voluntarily adopt such a legislative provision in its Unitary Development Plan in 2004 (The Merton Rule 2008a). As of 24th June 2008, 32 County, Unitary, London Borough, District, Metropolitan Councils and the Isles of Scilly have fully adopted 10+% renewable energy targets (The Merton Rule 2008b). Also, the Bill allows local authorities to set energy efficiency standards higher than those specified by Building Regulations (ACE 2008).

The Local Transport Bill 2007/08 that applies to England, Scotland and Wales (consultation closed on 17th October 2008) increases the flexibility of local authorities to introduce local road user charging pilot schemes and strengthens their control over transport planning (Department for Transport 2008).

In discussing whether or not a statutory duty should be imposed on local authorities to reduce emissions, the LGA Climate Change Commission supports the view that it should be introduced on those local authorities that are failing to tackle climate change within the next two years (2008 to 2010). A statutory framework that will include a duty is seen by the Commission as aligned with the devolution of power and autonomy to Local Government (LGA Climate Change Commission 2007a).

3.6 Additional powers and guidance for UK local authorities on sustainable energy and climate change

Apart from legislation, there are powers and guidance that assist local authorities to take action on sustainable energy and climate policy. The information is summarised in chronological order in table 4 that follows.

Table 4: Power and Guidance for UK Local Authorities on Sustainable Energy and Climate Change Mitigation	
Power and Guidance	**Potential Action**
Housing Acts 1985 & 2004 (LGA 2008c)	Building of a combined heating, cooling and power plant to serve housing developments
Town and Country Planning Act 1990 (LGA 2008c)	Legally binding agreement or planning obligation with land developers that brings benefits to the community
Environmental Protection Act 1990 (LGA 2008c)	Environmental protection with actions that can also help tackling climate change like improving air quality
Local Government Act 2000 (Office of Public Sector Information 2006c)	'Well being' power to improve the social, economic and environmental well being
Local Government Act 2003 (LGA 2008c)	Prudential borrowing for capital expenditure
Local Transport Planning Guidance 2004 (Footitt, Wood, and Turnpenny 2007)	Local Transport Plans; climate change should be one of the topics to be considered by Local Transport Authorities
Planning Policy Statement 22: Renewable Energy (Communities and Local Government 2004)	Planning policy of renewable energy projects
Planning Policy Statement 1: Delivering Sustainable Development (Communities and Local Government 2005)	Promotion of sustainable development
Local Government White Paper 2006	Combating climate change through encouragement and new opportunities
Planning Policy Statement in Climate Change (Communities and local Government 2007a)	Climate change as core element of the planning system
Local Government and Public Involvement in Health Act 2007 (LGA 2008c)	Opportunities to link community strategies with sustainable development
Sustainable Communities Act 2007 (LGA 2008c)	Opportunities to link community strategies with sustainable development

3.7 Local Government Performance Framework

3.7.1 Introduction

The Local Government White Paper 'Strong and Prosperous Communities', issued in October 2006, outlined that the new Local Government Performance Framework for Local Government aims to improve the quality of life and public services. A set of 198 National Indicators (NI) for English local authorities were announced in the Comprehensive Spending Review (CSR) in October 2007 (Communities and Local Government 2007b). The Performance Framework applies only to England (AEA Energy and Environment 2007b).

LGA is concerned that local partners who collaborate with local authorities, are less aware of the National Indicator Set (NIS) (set of the 198 National Indicators) compared to local authorities. LGA proposes that the latter should raise the awareness of the partners about the scope and usefulness of the NIS (LGA 2007a). The next section describes the two indicators on climate change mitigation. The indicators monitor changes of CO_2 emissions from local authority operations and changes of per-capita CO_2 emissions at the community level. Although there are local authorities that support that the climate change indicators will significantly raise the status of climate change within councils and will enhance the leadership role of the authorities, others (authorities) suggest that the indicators are welcomed but they do not place a statutory duty to act against climate change (Footitt 2007).

3.7.2 The indicators of climate change mitigation

Introduction

Defra was commissioned to produce indicators of environmental protection. The initial proposals were discussed with a number of stakeholders including CLG and other Governmental Departments. Defra's network included bodies such as the Environment Agency/Natural England/National Parks Authorities, LGA and some local authorities, Government Offices, the Audit Commission, policy specific bodies like UK Climate Impacts Partnership and the Sustainable Development Commission, local authorities that have been awarded the Beacon Status for waste and the Local Authorities Coordinators of Regulatory Services (LACORS). The climate change mitigation proposals were discussed extensively in workshops for several months (Defra 2007c).

Definition of climate change indicators

Defra has produced two climate change indicators, the National Indicator 185 that measures CO_2 emissions changes from local authority operations and the National Indicator 186 that measures CO_2 emissions changes in the local authority area.

NI-185: Changes in CO_2 emissions from local authority operations

This indicator aims to measure the progress of local authorities in achieving emissions reductions from activities involved in the daily function of the authorities that directly or indirectly result in emissions of CO_2 into the atmosphere. The indicator will measure the annual changes of CO_2 emissions with a baseline of 2008/2009. The figures are reported annually and the reporting organization is the local authority (county councils for its district authorities) that reports to the UK Government (Communities and Local Government 2007b). The first report to Defra is due to take place on 31st July 2009 and

the reporting year is the financial year (Defra 2008f). As of 12th September 2008, 35 LAAs included NI-185 targets (Energy Saving Trust 2008c).

The emission sources are those of electricity including street lighting and electric vehicles (grid and renewable if the surplus is sold back to the grid or it has a Renewable Obligation Certificate, or purchased through 'Green Tariff'), CHP, and fossil fuels (Defra 2008f). In July 2008 Defra concluded that employee commuting and social housing will not be included in the indicator. However, schools, outsourced services, and employee business travel are included (Defra 2008g). Some emission sources are not included in the calculation of the indicator. These are emissions from waste management due to the fact that these come as CH_4 emissions and not as CO_2, which leads to inconsistencies with the rest of the indicator. Indeed assumptions have to be made about the composition of the waste and how well the landfill is managed. These factors increase the uncertainty in the calculation of emissions. Actually, there is a separate indicator for waste. Similarly, CO_2 emissions from water usage are not included because they require a number of assumptions that increases the uncertainty in the numbers (Defra 2007d). The spatial level where NI-185 will be applied is Single Tier, District and County Councils (Communities and Local Government 2007b). In two-tier authorities, the lower tiers will report their emissions to the upper tier. The upper tier will then submit a single report to Defra which includes separate figures of emissions for upper and lower tier local authority level (Defra 2008g)

The LGA has expressed concerns over the clarity of the definition of the NI-185 indicator by stating that there is comprehensive guidance on the calculation for direct CO_2 emissions but not for indirect (LGA 2007a). Indirect emissions are those that are associated with activities of the authority but whose source is owned or controlled by another body. For example, indirect emissions are those from consumption of purchased electricity or heat, from the use of vehicles that are owned or controlled by other bodies and from outsourced activities like energy consumption at schools. Embedded emissions, like the CO_2 emissions of procured goods, are not taken into consideration. Local authorities that need assistance on technical definitions about NI-185 should get in touch with regional Government Offices or the Audit Commission (Defra 2008g).

Defra has developed an Excel spreadsheet tool that local authorities can use to calculate CO_2 emissions. The tool, which is based on the Carbon Trust's Baseline & Forecasting and VAS Tool, enables local authorities to measure progress against the indicator. Defra has made clear that local authorities should use this tool to produce the indicator (Defra 2008g). LGA states that there is an unintended consequence from the use of NI-185. That is, it works against the authorities that have already made significant emissions reductions because the indicator refers to reduction compared to a baseline. Thus, these authorities will already have a low baseline of emissions and it would be more difficult to further achieve significant reductions (LGA 2007a).

NI-186: Changes in per-capita CO_2 emissions in the local authority area

This indicator calculates per-capita CO_2 percentage change between a specific year and the baseline of 2005. The emissions are from the categories of (Defra 2008h):

- commercial/industrial and public sector from gas (including large gas users), electricity, oil and solid fuels, processed gases, wastes and biofuels, non fuel, off-road and agricultural oil and solid fuel, non fuel
- domestic from gas, electricity, oil and solid fuel, house and garden oil.
- road transport from major and minor roads, petrol and diesel and other transport.

Defra suggests that NI-186 is more significant than NI-185. The emissions dataset of NI-186 has been produced from Defra for 2005 and 2006 as a sub-set of its Local and Regional CO_2 Emissions Estimates. The figures for 2005 can be compared with those for 2006 as they have gained National Statistics Status (Defra 2008i). The spatial level where NI-186 is applied is Single Tier, District and County Councils (LGA 2007a). The definition of National Statistics Status according to the National Statistics Code of Practice is: 'The primary aim of National Statistics is to provide an accurate, up to-date, comprehensive and meaningful picture of the economy and society to support the formulation and monitoring of economic and social policies by Government at all levels' (UK Statistics Authority 2002). The National Statistics Status was first given to dBERR local gas, electricity and road transport energy consumption data for 2005 and 2006 in March and June 2008. These energy data were subsequently used as inputs to produce the National Statistics of Local CO_2 Emissions Estimates for 2005 and 2006 (AEA Technology 2008) and the emission sources of the NI-186 Indicator are part of Defra's local estimates (see Chapter 4 for more information on local energy data and local emissions estimates).

Defra's emissions are calculated on end user basis (end user emissions also include emissions from producing the fuel that the consumer uses). The emissions from the production of fuels are allocated to end users in proportion to their consumption of the specific fuel. The domestic sector includes all housing in the local authority area including Arms Length Management Organizations, private housing, and leased housing (AEA Technology 2008). Carbon dioxide emissions from sites of the EU Emissions Trading Scheme, except energy suppliers, are excluded from the indicator because these emissions are regulated by national policies. Road traffic emissions from motorways are also excluded because these motorways cross over local authority boundaries and local authorities have little influence on the decisions of people to travel on these motorways (Defra 2007d). Emissions from Land Use, Land Use Change and Forestry and diesel railway are also excluded (Defra 2008h). (All the above emissions sources are included in the Local CO_2 Emissions Estimates of Defra). Emissions from domestic aviation, fishing and coastal shipping and off-shore oil and gas extraction are not included in both NI 186 Indicator and Local CO_2 Emissions Estimates datasets because there is not an obvious way to allocate them to specific local authorities (AEA Technology 2008).

Local authorities are encouraged to seek out local data on their own although the data are collected by dBERR under an established methodology. This is seen to increase the understanding of the local authorities concerning the local drivers of emissions and could help to improve the quality of the published estimates (Defra 2007d). Probably such an approach will add confusion rather than help. LGA supports that the technical definition of the NI-186 indicator is clear in relation to the measurement method and reporting. LGA also states that the indicator needs to be 'studied' within local context because in different local authorities, emissions will be produced due to different factors. Concern should be given to the fact that the per-capita figure will depend on up to date population numbers (LGA 2007a). Local authorities that need assistance on technical definitions about NI-186 should get in touch with regional Government Offices or the Audit Commission (Defra 2008h). As of 12th September 2008, NI-186 featured in 100 LAAs and this was the fifth most popular LAA target. Most targets are between 9 to 13% reduction in 2010/11 from the 2005 baseline. This is a sign that many local authorities make a priority of their LAA the aim to reduce CO_2 emissions at community level (Energy Saving Trust 2008c).

3.8 Institutional bodies augmenting UK local authorities on sustainable energy and climate change

This section provides brief information about the most important bodies in the UK that augment local authorities in climate change mitigation. Information for IDeA has been provided in Chapter 2.

3.8.1 The Local Government Association

The Local Government Association (LGA) was formed on 1 April 1997 and promotes the interests of English and Welsh local authorities, a total of just under 500. These authorities represent nearly 50 million people and have a budget of around £74 billion a year on local services (LGA 2007b). The LGA owns the IDeA (IDeA 2007a). On 12 March 2007, the LGA Climate Change Commission was launched to consider how Local Government can respond more effectively to reduce greenhouse gases (LGA 2007c).

3.8.2 The Energy Saving Trust

Following the United Nations Conference on Environment and Development in Rio in 1992, the UK Government established the Energy Saving Trust, a non-profit organisation, funded both by Government and the private sector that provides support to local authorities to reduce carbon dioxide emissions (Energy Saving Trust 2007).

3.8.3 The Carbon Trust

The Carbon Trust is an independent company founded in 2001. It is funded by the Government and its role is to help the UK move to a low carbon economy by helping the business and the public sector reduce their carbon emissions (Carbon Trust 2007a).

3.8.4 Regional Development Agencies and Regional Assemblies

The Regional Development Agencies (RDAs) are responsible for business development interests in their region. Although, their primary focus is on the private sector there is a scope for them to support public-private partnerships including local authorities (Wade et al. 2007). The RDAs have a significant role to play in the fight against climate change according to the Energy White Paper 2007 (DTI 2007). The Regional Assembly (RA) is a forum where local authorities meet to discuss issues of regional importance. Their role also includes scrutinising the policy of their Regional Development Agency, integrating policy development and enhancing partnership

working at the regional level for social, economic and environmental policy (Wade et al. 2007). However, Prime Minister Gordon Brown MP decided in July 2007 to abolish Regional Assemblies from 2010 (Regional Assemblies 2008).

3.8.5 Government Offices

Government Offices are the primary means by which a wide range of Government policies are delivered in the English regions (Government Offices for the English Region 2007). The next sections describe studies that have assessed climate change policies of UK local authorities. Gaps in the literature are identified that can be addressed by a new case-study.

3.9 Assessment of climate change policies of UK Local Authorities

3.9.1 Introduction

The degree of action by UK local authorities in climate change mitigation has been recorded by Collier and Lofstedt in their comparative study for local authorities' involvement in climate change action in Sweden and the UK (Collier and Lofstedt 1997). They suggest that in the UK while there has been considerable activity in terms of drawing up emissions reduction strategies, implementation is the major issue and most times local authorities do not score well. The main reason is the lack of competence and power in significant areas and the lack of financial resources. They also argue that even in the forward thinking authorities, climate change strategies are marginalised and many of the measures are pursued with other environmental objectives in mind (e.g. the reduction of air pollution) and there is little political scope for wide ranging policies with high costs.

The fact that most local authorities are not proactive in sustainable energy is identified in the paper of Fleming and Webber (2004) which suggests that there are few proactive local authorities taking action with most of the others being inactive. Also, most active local authorities have targets in the range of 30% reduction at community level. Only Newcastle has a goal to go carbon neutral by 2025, and Leicester has a target of 50% reduction by 2025 (Baseline year is the year 1990 except in Newcastle which is not given in the paper). All other authorities work with a target of 30% or less, most of them from the 1996 level. Surveys on the progress of UK local authorities on climate change mitigation are presented in the next section.

3.9.2 Surveys on the progress of UK local authorities on climate change mitigation

The LGA, IDeA and De Montfort University Survey of 2002

In 2002 the LGA, the IDeA and De Montfort University conducted a survey of English and Welsh local authorities to identify progress in addressing climate change. The results were compared with those of a 2000 survey carried out by IDeA. The analysis (Allman, Fleming and Wallace 2004) suggests that most English and Welsh local authorities have made little progress in climate change mitigation. Local authorities have been active on single issues like the use of renewable energy and the purchase of green electricity where one department is usually responsible for making the decision. On the contrary, in more complex activities like the preparation of an emission inventory or the development of energy policy, where the cooperation of various departments is required, little progress is identified.

Different barriers in addressing climate change were reported by the successful and less successful authorities. For example, lack of support from elected members and lack of funding were less of an issue for successful authorities than they were for the other authorities. This means that if more resources were given to less successful local authorities they could engage more staff time to the development of long-term energy strategies. In addition, the successful counties and districts have better communication between authorities and departments and have better chances to be part of regional energy groups. The less successful authorities mentioned that they need more guidance from the Central Government in contrast to the more successful authorities (Allman, Fleming and Wallace 2004). The more successful authorities suggest various key success factors in climate change mitigation: Firstly, strong political, professional and technical support at the local level; secondly, increased awareness of the co-benefits of climate change mitigation; thirdly, the use of innovative project funding mechanisms for raising finance; fourthly, the sharing of knowledge, information and best practice between authorities (Allman, Fleming and Wallace 2004). The study concludes that most local authorities do not yet have the necessary resources and skills to undertake successful climate change mitigation. However, the more successful authorities reveal that they can achieve deep emission cuts if they are provided with resources and support (Allman, Fleming and Wallace 2004).

The LGA, IDeA and EST survey of 2004

The LGA, the IDeA and the Energy Saving Trust survey conducted in 2004 (LGA, IDeA and Energy Saving Trust 2004) found that the three most important challenges facing local authorities with regard to climate change mitigation are: inadequate staff or staff time (87%), priority given to other issues in the council (87%), and lack of funding (85%). This survey found also that 49% of local authorities have climate change measures integrated significantly into the community strategy. In 49% of local authorities there are elected members who have a portfolio for sustainable energy and climate change. Almost three-quarters of local authorities have the sense that they have not been very effective in tackling climate change in their local area. Of the local authorities that signed the Nottingham Declaration on Climate Change only 25% have published an action plan on climate change; only 20% of local authorities have targets to develop renewable energy sources in their community area (LGA, IDeA and Energy Saving Trust 2004).

3.9.3 Discussion on the surveys

As the sections 3.10.1 & 3.10.2 showed, there are few academic studies exploring the key success factors for or the barriers local authorities face in climate change mitigation. The most comprehensive study is the LGA, IDeA and De Montfort University Survey of 2002 which incorporates analytical factors in the investigation, for example by making the division between successful and less successful authorities. However, this study was not linked with much analysis on what the authorities could do to improve performance. Also, the LGA, IDeA and Energy Saving Trust survey of 2004 provides descriptive statistics for the performance of all authorities without much analysis behind the numbers. Furthermore, there is no academic study on evaluating qualitatively the performance of UK local authorities under their three roles as Estate Manager, Service Provider, and Community Leader which could provide useful insight on how the authorities perform in these roles. The UK policy regime at the local level has been putting more emphasis on the community leadership role of UK local authorities in climate change mitigation since 2000 (and especially after 2006 with the advent of the Local Government White Paper). Thus, there is a particular need to assess the climate change performance of the authorities in their community role to see how they have initially responded in these new policy directions. Also, it would be useful to explore whether barriers to action have changed since the last survey in 2004. The case-study of this thesis aims to fill the above gaps in the literature by analysing

the baseline position of a sample of twenty UK local authorities on climate change mitigation under the three above-mentioned broad roles, identifying barriers to action and exploring strategic measures to improve their performance.

3.10 Conclusions

This Chapter revealed that there is a significant role for UK local authorities concerning greenhouse gas management that if fulfilled can lead also to various co-benefits. The UK energy policy regime that influences action at the local level is complex and has been changing rapidly since the start of this research. There is no legislation to impose a direct statutory duty on local authorities to reduce greenhouse gas emissions. However, there are many other legislative powers in the housing, road transport, planning and finance domains that can be used to combat climate change. UK local authorities have evolved into bodies that are 'solution oriented' and this approach fits with saving emissions. The CAA that will be introduced in April 2009 can bring sustainability to the actions of local authorities. Local authorities are required under the Local Government Performance Framework to report their community-wide and own CO_2 emissions. Since the last survey on the baseline position of UK local authorities in sustainable energy and climate change that was conducted in 2004 (LGA, IDeA and EST 2004), the impact of this new policy regime on the performance of local authorities has not been thoroughly assessed.

The requirement imposed by the Local Government Performance Framework on local authorities to report CO_2 emissions from their operations and at community level will help in identifying whether targets of climate change policies are met. This information can provide an overall signal as to whether the local authority should change its climate change policy. As the next Chapter reveals**,** this requires the availability of reliable local energy consumption data for a number of years. Appendix 1 provides information on policy tools available to manage greenhouse gas emissions at the local level in the UK. This Chapter showed that there is a need for more qualitative academic research on the baseline position of UK local authorities. This topic along with key strategic and policy issues on local energy and climate policy are explored in this thesis through a case-study of expertise transfer to less successful authorities. The next Chapter describes the local energy and carbon dioxide data in the UK and assesses whether they can be used to reliably monitor changes in emissions at community level from year to year.

4. Local Energy and Carbon Dioxide Data in the UK

4.1 Introduction

This Chapter assesses whether the available local energy consumption data for gas, electricity and road transport are accurate enough and provide adequate longitudinal data to compare year on year CO_2 emissions in UK local authorities at community level. Previous studies that have made use of these data are reviewed. Information on the International Local Government Greenhouse Gas Emissions Analysis Protocol of ICLEI is presented and it is assessed whether it should be used by UK local authorities.

4.2 Energy consumption data at postcode level

This section describes the energy consumption data at the local level for electricity, gas and transport. These categories account for nearly 80% of total energy consumption (dBERR 2007a). The exercise of dBERR to produce statistics at regional and local authority level has been improved since the first trial which is dated for gas consumption for 2001 and 2002 (DTI 2003b) and electricity for 2003 (DTI 2004).The gas consumption allocation was based on postcode National Grid Transco (NGT) sales (DTI 2003b) but for 2004 gas consumption and onwards the Annual Quantity based on meter readings is used (dBERR 2006a). The annualized consumption is allocated to a Local Administrative Units (LAUs)[8] by using geographical mapping postcode software. The new methodology is more reliable and as a result the figures produced for 2005 and 2006 are of better quality compared to previous years (dBERR 2007a).

For electricity statistics, the sub-national figures are 80% based on actual meter reading and 20% on estimates using the Estimated Annual Consumption. The geographical mapping software that matches Meter Point Administration Number's (MPAN) postcode information to LAUs has been improved from year to year and standard correction exercises in the address has been introduced and more non-domestic loads have been identified in the addresses and transferred from the domestic sector to the commercial/industrial. As a result of the refinement in the

[8] These areas correspond to district or unitary authorities. LAUs include the 354 individual London boroughs/metropolitan districts/unitary authorities/local authority districts in England, the 22 individual local authorities in Wales, the 41 unitary authorities in Scotland and the 26 individual district unitary authorities in Northern Ireland giving a total of 443 UK LAUs (Office for National Statistics 2008a). DTI used the term NUTS4 areas for local authority areas in its articles that describe local energy statistics but the Office for National Statistics does not use this term anymore. Instead it uses the term Local Administrative Unit and this is why this term is used in the thesis.

methodology, data figures for 2006 are of better quality compared to previous years (dBERR 2007a). The local gas and electricity consumption statistics for 2005 and 2006 were updated on the 28th of February 2008 and received National Statistics Status in March 2008 (dBERR 2008a and dBERR 2008b for gas and electricity respectively). The relevant data for 2007 were published in December 2008 using the same methodology as for the revised 2005 and 2006 data; they also have the National Statistics Status (dBERR 2008a; dBERR 2008b).

Middle Level Super Output Statistics (MLSOS) have been produced for 2004 (electricity) 2005 (electricity and gas), 2006 (electricity and gas) and 2007 (electricity and gas) (dBERR 2007b, DECC[9] 2008). This is a more disaggregated level than the LAU and could be used to better target interventions of local energy strategies (dBERR 2007b). The electricity data for 2005 are more reliable because the proportion of the unallocated consumption has been reduced compared to the 2004 data. Data have been produced also for 2006 with the similar methodology and reporting arrangement as for 2005 data (dBERR 2008c). MLSOA data for 2006 were produced in February 2008 and received National Statistics Status in March 2008 (dBERR 2008d). The 2005 data were produced in July 2007 when no local energy data had National Statistics Status. However, they received the Status in March 2008 without being revised because dBERR assessed that they were deemed to already be of sufficient statistical standards to be reclassified from experimental to National Statistics (Knight 2008). MLSOA data for 2007 of National Statistics Status were published in December 2008 with the same methodology applied for the 2006 data (DECC 2008).

Road transport data has been estimated for 2002 and 2003 (dBERR 2007b), 2004 (dBERR 2007c), 2005 (dBERR 2007d), 2006 (dBERR 2008e) and 2007 (DECC 2009). The methodology has been improved since 2004. However, the estimates are based on modeled data and this introduces a higher level of uncertainty compared to metered consumption of gas and electricity. The estimates are based on traffic flow data and fuel consumption factors (dBERR 2007b, c, d). The 2005 and 2006 road transport dataset received National Statistics Status in March 2008. (dBERR 2008e). In June 2009, the DECC published the National Statistics Status road transport fuel data for 2007. Two major changes were applied in the methodology for the 2007 data: a. The

[9] DECC stands for Department of Energy and Climate Change. DECC was formed on 3rd October 2008 by the Energy group from the Department for Business, Enterprise and Regulatory Reform (BERR) and the Climate Change group from the Department of Environment, Food and Rural Affairs (DECC 2008).

use of more detailed vehicle speed data; b. A more accurate fuel split between petrol and diesel cars. In addition, the data for 2005 and 2006 were revised using the same methodology as for the 2007 data (DECC 2009).

The review shows that data of gas, electricity and road transport have gained National Statistics Status only for the 2005, 2006 and 2007. Data for previous years are classified as experimental and dBERR and the former DTI as well advise the users that changes in the experimental figures from year to year are mainly due to changes in the applied methodology. Thus, there is still not enough accurate longitudinal data to reliably compare year on year local CO_2 emissions. This is confirmed by previous studies that made use of the experimental data and are provided in the next section. The different methods of data collection for all years are presented in Appendix 2.

4.3. Local emissions estimates on behalf of Defra

4.3.1 Local CO_2 emissions estimates for 2003

Introduction

AEA Technology produced on behalf of Defra local and regional CO_2 emissions estimates for 2003. The aim of the work was to produce nationally consistent CO_2 emissions at the local level. The estimates intend to initiate thoughts and discussions on how to quantify emissions at the local level. Some energy consumption data that have been used to produce the estimates are associated with high uncertainty as they are modelled and their spatial distribution is based on distributions for example of population and employment across the local authorities. Still, the estimates are a starting point for discussions and have been used in the Government's Sustainable Development indicator set and the Quality of Life indicators of the Audit Commission (AEA Technology 2005).

Methodology

This method estimates emissions from the domestic, commercial and industrial (including UK industrial sites of the EU Emissions Trading Scheme -EU ETS), road transport (including motorways) and land use change sectors. Emissions from electricity data are based on energy consumption at the point of use rather than to the location of emissions (for example at the power stations) that is the standard practice for data from the National Atmospheric Emission Inventory (NAEI). This is because electricity data are produced from DTI at the point of consumption. Data for industrial processes are taken from the NAEI contract. Nearly all other data except for gas and

electricity are modelled. An average emission factor has been used for electricity emissions in terms of $ktCO_2$ per GWh. This factor is taken from the 2003 UK inventory and assumes that the share of each energy source in the mix of the sources used to produce electricity (coal, oil, gas and renewable energy sources) does not change throughout the country.

Results

The spreadsheet that comes with the report includes emission broken down by sector and fuel together with population figures and per-capita emissions. The report provides UK maps of total per-capita CO_2 emissions in t/CO_2, domestic, commercial and industrial and road transport emissions in $KtCO_2/Km^2$. Although there are uncertainties with the estimates as they are classified experimental by Defra, they have been used in some studies, by local authorities, regional observatories and environmental organisations (AEA Technology 2006).

4.3.2 Local CO_2 emission estimates for 2004

Methodology

There are some changes in the methodology for 2004 estimates from AEA Technology. The most important is that the data in the road transport are taken from the newly produced data of the former DTI. Also, land use and forestry have been added to the land use change category of the 2003 estimates forming the land use, land use change and forestry category (LULUCF). The deforestation and the agricultural soil emissions have been moved from the industrial and commercial sector in 2003 to the LULUCF category. In the industrial and commercial sector some sources have been added. Installations of the EU ETS are still included. These are the industrial gas (large users), the industrial and commercial biomass, the industrial non fuel, the agricultural oil and solid fuel. In the domestic sector the domestic household product source has been added. Emissions from installations of the EU ETS and from motorways are included in the dataset. The methodology of spatial distribution for gas and electricity has been improved (AEA Technology 2006).

Results

Detailed data for local authorities is included in a spreadsheet. There is an inconsistency related to the per-capita CO_2 emissions: the relevant figure in the report is described as that referring to total per-capita emissions, but it actually gives the domestic per-capita emissions as it is specified on the map and its legend. Domestic, commercial and industrial and road transport emissions are shown as Kt/Km^2 on maps

such as for 2003, as well as net land use change emissions at Kt/Km^2. The figures cannot be compared with those for 2003 because changes are attributed mainly to changes in the methodologies applied to spatially distribute the energy consumption data and changes in the estimation of the national totals for the 2004 inventory that are used to distribute emissions to local authorities for example based on employment and population distributions. For instance, significant changes in the national totals are observed for industrial off road machinery, agriculture oil and solid fuels, railways, domestic solid fuels (increase in emissions) and domestic oil and road transport other (both decreases). The results are still experimental (AEA Technology 2006)

In October 2007, AEA Technology published results of a revised set for UK local authorities of the 2004 estimates excluding installations of the EU ETS and motorways. Emissions from motorways have been separated from total emission of major roads and then aggregated to local authority level. Then emissions from A roads were calculated by the difference between major roads and motorways emissions in each local authority. The emissions sources included in this dataset were proposed by AEA Technology to be those of Defra's per-capita climate change indicator at local area (still its content had not been finalized). This report also presents the percentage error for per-capita CO_2 emissions of these revised estimates only for England authorities (excluding LULUCF) which is found to be 2.65% or lower for most of them. This is in contrast to high uncertainties associated with some energy data due to the fact that emissions are dominated by gas and electricity whose accuracy of spatial distribution has improved considerably and because some errors of individual sectors in a local authority cancel out errors in other sectors. The results are shown in a geographical map, which is contained in the report, where users can get an idea of which areas are associated with specific bands of uncertainty (AEA Technology 2007a).

4.3.3 Local CO_2 emissions estimates for 2005

Methodology

AEA Technology estimated local CO_2 figures for 2005 (AEA Technology 2007a). The sources of emissions were the same as those of the original 2004 dataset meaning that EU ETS and motorways were included. Again changes in emissions are attributed mainly to changes in the methodology applied. The gas and electricity consumption data that were used in the production of these emissions estimates are of better quality compared to those used in the emissions estimates for 2003 and 2004.

Results

Similar format of results as for 2004 are presented in this report and the accompanying spreadsheet. Additionally, results of the uncertainty exercise are presented at UK level and the percentage error for per-capita emissions (excluding LULUCF) is 2.5% or lower for most UK local authorities. The uncertainties are shown in a UK map which is contained in the report (AEA Technology 2007a).

4.3.4 Local CO_2 emissions estimates for 2006 and revised estimates for 2005

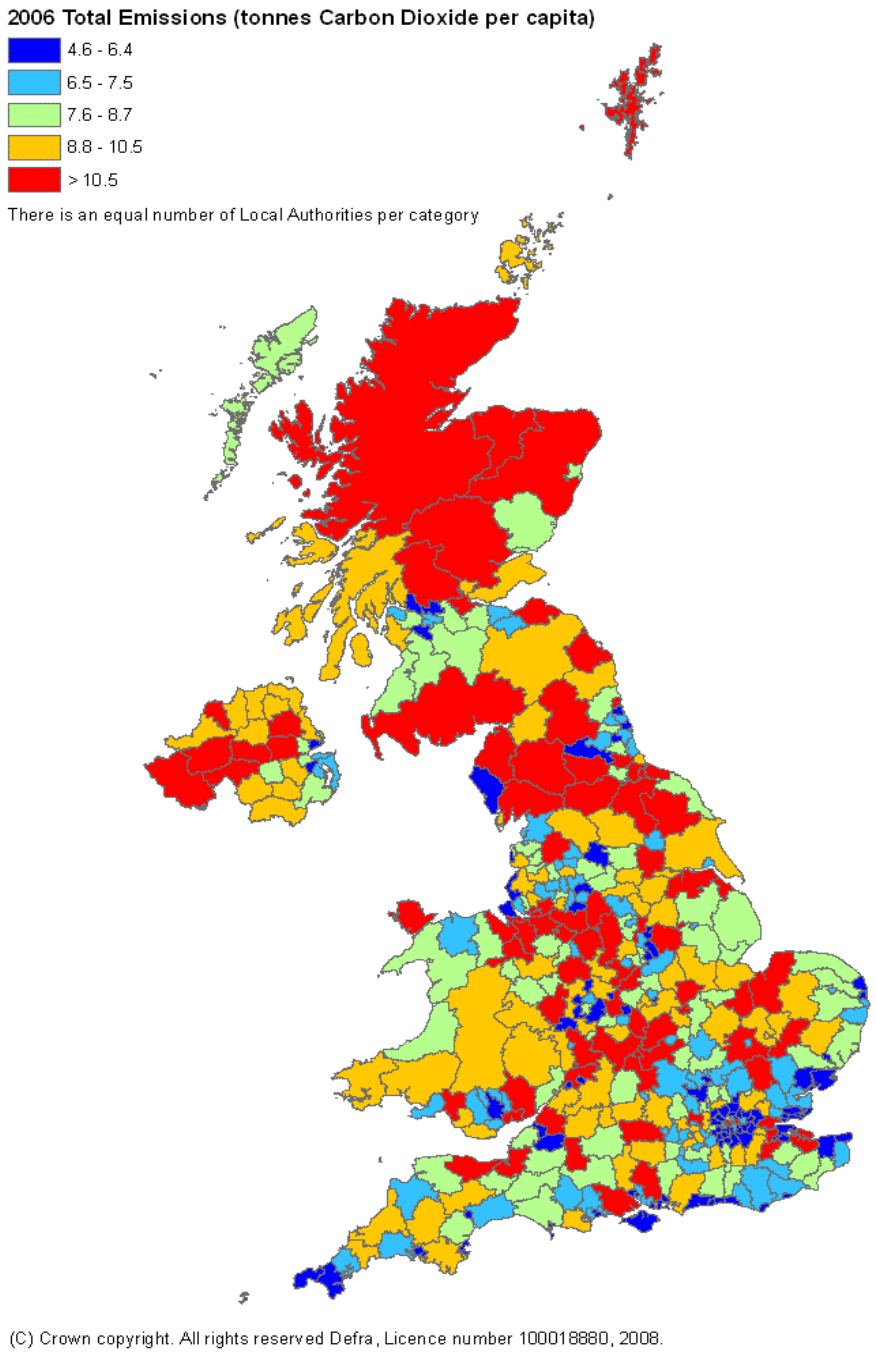
Methodology

On 18th September 2008, AEA Technology published the local and regional CO_2 emissions estimates for 2006 and revised estimates for 2005. The emission sources are those of the original 2005 estimates. These are the first estimates that receive National Statistics Status and comparison between these two years for individual authorities is valid. The National Statistics Status is due to the classification of the used dBERR data as National Statistics, reduction in the uncertainty of the accuracy of some of the data inputs and improvements in the quality assurance procedures (AEA Technology 2008).

Results

Instead of presenting the results in Kt/Km^2 for the categories of domestic, commercial and industrial, road transport and LULUCF, these are given in tonnes/capita in the report but only for the 2006 estimates. The average per-capita emissions, excluding LULUCF, were 8.8 tonnes in 2006. Variations in emissions are mainly due to the different quantity of industrial and commercial activity. Uncertainties for 2006 are again at or below 2.5% for most of the UK local authorities. Higher uncertainties are found normal in rural areas because these are dependent on non-gas fuels and the percentage of minor road traffic is higher. Maps and uncertainty estimates for the revised 2005 figures have not been produced; however the spreadsheet accompanying the report contains the 2005 and 2006 emissions broken down by sector and fuel together with population figures and per-capita emissions for each local authority that refer to the NI-186 (AEA Technology 2008). Figure 1 that follows shows the per-capita CO_2 emissions in tonnes for 2006 by UK local authority, excluding LULUCF.

Figure 1: Per-capita CO_2 emissions by UK local authority for 2006 (tonnes CO_2, excluding LULUCF)



Source: AEA Technology (2008)

Planned improvements for the 2007 dataset are associated mainly with road transport in relation to review of speeds data, vehicle fleet composition, fuel consumption factors, and improved geographical distribution of traffic flows (AEA Technology 2008).

The revised 2005 estimates will be used as a baseline for local authorities to compare with future emissions. Any improvements in the methodology will be incorporated in the longitudinal data starting from 2005 and revised estimates will be produced so that they are consistent with each other (Defra 2008i). The methodological summary of the 2006 report suggests that due to circumstances that vary between authorities, especially in industrial and commercial activity, a comparison across authorities is not advisable. However, the 2005 and 2006 emissions can be compared for each authority individually because they are of National Statistics quality, as they have the same methodology and they are consistent (Defra 2008b).

4.4 The Best Foot Forward study

In June 2006 Best Foot Forward produced on behalf of East Midlands Regional Assembly baseline energy consumption data and CO_2 estimates for local authorities in East Midlands (Best Foot Forward 2006). The analysis includes the energy sources of gas, electricity, oil, coal, manufactured solid fuel (MSF) and renewable energies and waste split in the domestic and industrial and commercial sector. The consumption for road transport is also included. Emissions estimates are only those from combustion of energy, thus the non fossil fuel use emissions or those from industrial processes and land use change are not included. The 2003 DTI energy consumption data has been used as a basis for the study but there are some differences in the methodology compared to Defra's approach:

- All data used are those for 2003 as in Defra's study but data for oil and gas are more up to date than those used in Defra's study.
- This study, in contrast to Defra's, presents results on a per dwelling basis by combining emissions with data on the number of households in local authorities. The source of data on dwelling numbers is the Office for National Statistics.
- Defra's study includes non combustion emission sources like process use, land use change and non-fuel CO_2 sources.

Reliability difficulties associated with the results are noted by the authors. For example, concerning residential emissions of local authorities arising from gas, oil, electricity, coal and MSF consumption, they suggest that conclusions should be drawn with caution due to difficulties with reliable energy consumption allocation at local authority level. Comparison with Defra estimates shows that total domestic emissions are about 10% lower compared to Defra's. This is due to differences in approach and the newer data for oil and coal. The industrial and commercial emissions from gas, electricity, oil, solid fuels and renewable energies and waste emissions are 12% lower compared to Defra's figures.

4.5. Data issues relevant to the research methodology

The analysis of the local energy and emissions data in this thesis lead to the following points:

- There are three years of reliable data which have received the National Statistics Status. Thus the longitudinal data cannot still be used to assess the progress of UK local authorities on climate policy.
- Data other than gas, electricity and transport are associated with a considerably higher degree of uncertainty compared to these three emissions sources. Thus, this thesis is looking at gas, electricity and transport, because they also contribute to the bulk of energy-related greenhouse gas emissions in the UK.
- Comparing local authorities is not advisable even for data that have received National Statistics Status. The reason is that authorities have their own distinct circumstances which strongly influence their ability to take action on managing emissions.
- The energy data are real and there is not a need for complex software to model energy consumption. Instead, spreadsheets can be used to apply emissions factors and calculate the associated emissions. Defra has produced toolkits for such a task and authorities are required to use them.
- Due to the above mentioned issues on data availability, the thesis did not attempt an in-depth time series analysis for a large number of UK authorities. However, the trend of emissions from 2005 to 2007 for the authorities of the case-study will be identified, in order firstly to link the two main parts of this research which are the assessment of progress on local climate policy based on the metric of carbon dioxide emissions and the qualitative policy factors that

arise from the case-study. Second, to highlight any interesting differences in the emissions of the case-studied authorities before and after their participation in the mentoring scheme. This is done by looking at the data for 2005 and 2006 that refer to before the case-study and those for 2007 that refer to after the case-study. The mentoring scheme was carried out between December 2006 and May 2007. An excel spreadsheet is used as a means to calculate the emissions of the authorities.

- The two main parts of the thesis are linked additionally by drawing information from the participating authorities on how, if at all, they make use of local emissions data internally in their local administration in order to advance climate policy.

4.6 International Local Government Greenhouse Gas Emissions Analysis Protocol

ICLEI in its effort to help local authorities to combat climate change is developing a Greenhouse Gas Emissions Analysis Protocol which has almost taken its final shape (ICLEI 2008a). The inventory described by the Protocol is separated into emissions from local authority's internal operations and those from the whole community for a single year. Emissions that occur outside the geopolitical boundaries of the community but are a result of decisions and actions in the community, are also included in the community inventory. Both inventories are sub-divided into sectors compatible with international standards for classifying greenhouse gas emissions. The degree of detail in reporting emissions depends on the availability of data and on the level of detail that is needed for the actions planned. For example, in the residential sector of the community inventory all dwellings could be included in the same record or alternatively records could breakdown emissions from single family houses, multifamily houses etc. (ICLEI 2008b). Three Tiers are defined for activity data and emission factors. The degree of complexity and accuracy in activity data and emission factors increases as the Tier gets higher. For example, Tier 3 activity data includes metered energy consumption. Local authorities are encouraged to collect the more accurate activity data which, unfortunately, is not always available. However, this approach should be balanced against the level of detailed data that is needed in the action plans (ICLEI 2008b)

ICLEI's Emissions Analysis Protocol is available on-line as a draft and the final version and publication will take place soon [information as of mid-October 2008] (ICLEI 2008a). This method differs from the one used by Defra in the development of the climate change indicators of the Local Government Performance Framework, thus, it is expected to result in some duplication of work if adopted by UK local authorities. Nonetheless, ICLEI's Emissions Protocol could help local authorities identify emission sources that are not included in the climate change indicators of the Local Government Performance Framework. Also, involvement with ICLEI will add credibility to the effort of UK local authorities to manage local greenhouse gases thus raising the opportunities to attract financial support and involvement in partnerships with stakeholders. For example, in the State of New England, USA, many communities that participate in ICLEI's Cities for Climate Protection campaign have, partly due to their membership, attracted funding from diverse sources like the United States Environmental Protection Agency and private foundations (Young 2007).

The World Mayors and Municipal Leaders Declaration on Climate Change that was adopted on 7 December 2005 in Montreal, Canada states that the participating Mayors are committed to use standardized mechanisms to measure reductions of greenhouse gases for comparative analysis and verification (Linstroth and Bell 2007). This aim could be fulfilled by implementing ICLEI's Emissions Analysis Protocol. For the above reasons, this thesis recommends that the UK local authorities apply the ICLEI Emissions Protocol if they have spare resources and measure the progress of their climate change strategies according to both emission estimates for the Local Government Performance Framework and ICLEI. However, although this approach seems sensible it is not straightforward that it will be adopted in practice. As Webber and Fleming (2008) report, local authorities will want to spend all their financial resources on implementing sustainable energy projects rather than collecting data to evaluate their performance.

4.7 Conclusions

Defra has conducted studies on CO_2 emissions at local (community) level in the UK for 2003, 2004, 2005 and 2006. Due to changes in the methodology of the collection of local energy data used in these studies, comparison of results is valid only between 2005 and 2006, the years for which the energy data have received National Statistics Status. Defra has produced local emission estimates of National Statistics Status for

2005 and 2006. The relevant 2007 dataset based on the energy data for 2007 will be released in September 2009. Defra has also produced a sub-set of emissions estimates from the 2005 and 2006 data that refers to the per-capita carbon dioxide national indicator NI-186. At the moment the accurate longitudinal data is too short to reliably monitor trends in CO_2 emissions at the local level. Once a longer time series becomes available in the future, local authorities could use the estimates to monitor CO_2 emissions and assess whether they meet their emission targets at community level. It is proposed that UK local authorities use ICLEI's Emissions Analysis Protocol if they have spare resources. Chapter 5 describes the case-study of a sample of twenty UK local authorities whose findings are presented in Chapter 6. Chapter 7 concludes with findings from both the energy and emissions data analysis and the case-study.

5. A Case-Study of Twenty UK Local Authorities on Sustainable Energy and Climate Change

5.1 The case-study

The Beacon Scheme was introduced by the Government in 1999 with the aim of recognising excellent performance in Local Government and to promote dissemination of good practice in service delivery between local authorities. Government Ministers select, for each round of the scheme, 10 themes that are perceived to be important for the day-to-day lives of the citizens and reflect key Government priorities. Themes are announced one or two years in advance and some of them are repeated in future rounds. Local authorities that can show clear vision, an excellence in services, and motivation to innovate within a theme are awarded the Beacon Status by Government Ministers based on recommendations of an independent advisory panel (IDeA 2006b). The Beacon Scheme is administered by IDeA (IDeA 2007a). In 2005 seven local authorities were selected as beacon councils for Sustainable Energy (IDeA 2005a). The case-study of the thesis explored a pilot mentoring scheme of transfer of expertise on sustainable energy and climate policy from the seven beacon councils, the mentors, to seven less successful non-beacon authorities, the mentees. (See table 1 on page 17 for information on which authorities participated in the case-study). The scheme included face to face meetings as well as follow-up telephone discussions and exchange of emails. The value of face to face communication on networking and adoption of improved practices on energy is reported in the review of 'City Energy Networking in Europe' by Keiner and Kim (2008) who state in relation to modes of communication methods in networking[10]:

'Finally, modern communication methods have changed the face of networking, but at its heart it remains the same. Personal contacts and individual initiative determine the success of networking efforts'.

Indeed, Dunwoody (2007), in her analysis on the challenge to make a difference using media messages to communicate climate change and facilitate social change argues that:

[10] Information on transfer of expertise through energy networks at the international level is presented in Appendix 3.

'Specifically, the gold standard for behavioural change remains interpersonal channels. If you want someone to change his beliefs, or even more dramatically, to change his behaviours in ways that are novel and at least initially inconvenient, the best advice that information campaigners can offer is *talk to him'*.

In the case-study, each beacon guided a less successful authority by using the Sustainable Energy Toolkit (thereafter referred to as the toolkit). Also, six less successful authorities participated in the scheme without receiving any guidance from a beacon council (the stand-alone authorities); they just used the toolkit by themselves. The toolkit was produced specifically for the pilot scheme from the beacons with support from the former DTI, Defra, IDeA, CLG, Marches Energy Agency and CAG Consultancy. The toolkit (in the form of an interactive CD-ROM) was sent to all authorities participating in this project in November 2006[11] and the mentoring process began for most local authorities in December 2006, (with some delayed until the new year) for a period of 3 months up until 31 March 2007 (which included 25 mentoring days).

The toolkit is divided in four main parts. The first part explains the policy context of energy at the local level in the UK. The second part presents information on the structures and processes a local authority needs to establish before delivering sustainable energy policies. The third part explains how a local authority can deliver emissions reductions through its roles as an Estate Manager (EM), Service Provider (SP) and Community Leader (CL). The fourth part is the benchmark matrix that enables authorities to self assesses their performance in sustainable energy. The matrix of the toolkit is based on the CSE Local and Carbon Management Matrix 2005 (CSE 2005). A more detailed description of the content of the toolkit is provided in the next section 5.2. The matrix is structured around the two broad areas of sustainable energy described in the toolkit. The first is the *process* and applies to all three local authority roles. The second is the *delivering at the local level* which includes the *service delivery* for the Service Provider role*,* and the *policies and programmes* for the Estate Manager and Community Leader roles.

[11] All UK local authorities received the toolkit in July 2007, and an additional 1000 CD versions only (rather than the full printed document with a CD) were distributed to individuals during 2008, both in local authorities and independently (Buxbaum 2008).

Table 5 that follows summarizes explanatory comments for the organizational type of the authorities within the case-study (mentor, mentee, stand-alone), their role on sustainable energy (estate manager, service provider, community leader) and the two broad areas of the toolkit where they should concentrate their efforts (process, delivering at the local level). Details on the *process* and *delivery of policies* are provided in section 5.2 which describes the content of the toolkit. These two areas are referred to as functions in the figures of Chapter 6.

Table 5: Organizational type, role on energy, and toolkit areas of work for the case-studied authorities

Organizational type	Role of authority	Toolkit area of work
Mentor: A beacon council (successful authority) for sustainable energy which guides a less successful authority in the case –study.	Estate manager: Responsible for managing the energy consumption and ghg emissions of its own estate, mainly city council buildings and vehicle fleet.	Process: Setting the correct institutional and organisational structures and mechanisms that will prepare the ground for developing and implementing policies. Main areas are leadership, corporate support, finance, information and decision-making. Applies to all three roles of authorities.
Mentee: A less successful authority on sustainable energy which receives one to one mentoring from a mentor authority. Mentoring is basically face to face but it also includes email and telephone communication.	Service provider: Responsible for managing energy consumption and ghg emissions related to the provision of public services like social housing, travel plans, land-use planning, and outsourcing of public services to business.	Service delivery: The provision of public services for the benefits of citizens (see relevant role for main field of work). Applies to service provider role.
Stand-alone: A less successful authority on sustainable energy which uses the toolkit by itself without external support from a mentor authority.	Community leader: Responsible for engaging with the civic, business and public bodies on managing energy consumption and ghg emissions. Main areas include planning, transport, awareness raising, consultation, and working in partnerships.	Delivery of policies: The implementation of projects and programmes that bring reduction on energy consumption and ghg gas emissions. The associated co-benefits like better local air-quality, economic regeneration, fuel poverty alleviation, and improved social cohesion contribute to the ultimate goal of making communities better places to live and work in. This is the most important area of work for local authorities since the bulk of emissions reduction takes pace at the wider community compared to estate management or service provision. However, it is also the most challenging due to the competing interests of a plethora of social groups and players. Applies to estate manager and community leader roles.

The purpose of the case-study was to identify key issues that could assist the less successful authorities to become more active in setting the processes for and implementing sustainable energy policies. Additionally, to explore the baseline position of the authorities and to find out how, if at all, the authorities measure the progress of their climate policies. The beacons received tailored training for the requirements of the mentoring scheme from the IDeA (Buxbaum 2008). Originally it was envisaged that the

LGA and the Energy Saving Trust would provided some mentoring during the scheme (IDeA 2005a). However, these stakeholders did not participate in the mentoring (Buxbaum 2008). The beacon councils for Sustainable Energy are committed to working with partners to improve performance (IDeA 2006a) and adopted the following statement in relation to the mentoring scheme (IDeA 2005a):

'We aim to share our knowledge, experience and expertise on sustainable energy via an in-depth mentoring programme, with local authorities that are genuinely committed to change management, in order to make significant and measurable service improvement'

5.2 The Sustainable Energy Toolkit

The aim of the toolkit and its benchmark as defined in the executive summary is to guide local authorities towards better performance on sustainable energy. This toolkit includes a plethora of good practice on local climate policy from the UK experience and provides links to a number of case-studies and other resources to support local authorities. The toolkit refers to elements of a holistic approach to energy management and provides suggestions on outcomes and targets on sustainable energy that may be useful for local authorities. The toolkit has 4 main parts which are described in the next sub-sections. The toolkit is available online in IDeA's website but not as a single document. Rather there are web links to the various parts of the toolkit. The links can be found at www.idea.gov.uk/idk/core/page.do?pageId=8783769 (IDeA 2009a). Alternatively, the toolkit can be obtained as single file from Nottinghamshire County Council by contacting beaconenergy.en@nottscc.gov.uk.

5.2.1 The policy context

The first part of the toolkit explains the UK national and local policy context for sustainable energy and adequately describes the need to take action and reduce emissions at the local level. There are links to key policy documents and topics related to sustainable energy ranging from the 2003 Energy White Paper to the Planning Framework and the Climate Change and Sustainable Energy Act 2006. Particular emphasis is placed on the new Local Government Performance Framework and the role of Local Strategic Partnerships and Local Area Agreements. This reflects the increasing emphasis placed by the government on climate change for the UK local authorities within the context of the assessment of their relevant performance.

5.2.2 Setting the processes and structures

The second part of the toolkit describes the processes and institutional structures that could assist local authorities in preparing the ground in order to develop and deliver measures. The decision-making mechanisms and corporate support are basic elements in this endeavour. There are six broad areas where the authority should focus on: a. leadership; b. corporate support; c. finance; d. information; e. working in partnerships; f. translating the vision into action. Each area is then described including best examples, links to further resources and a self-assessment checklist. This list asks critical questions that can guide the authorities on improving their position in a particular area. For example, in the leadership involvement sub-area the question posed is:

'Is there agreement from Elected Members and the Chief Executive that your Local Authority should take a lead in promoting sustainable energy?'

An example of a checklist question from the 'information' area is the following:

'Do you have sufficient data to enable you to make decisions about what the most effective energy actions are, what the costs of actions will be and what will be the payback period?'

The analysis of each of the six sub-areas concludes with a 'helping hand' box which notes key resources on the topic and mentions the element of the benchmarking matrix that is relevant to the sub-area. For example, in the 'getting the finance right' sub-area, the toolkit states that this topic is related to section 3.23 of the benchmarking matrix: Public sector energy management (there are three other benchmark elements for finance).

5.2.3 Delivering at the local level

The third part of the toolkit refers to the delivery of measures and policies at the local level. This field is divided into eight sub-areas which are: a. building energy management; b. procurement; c. housing; d. planning; e. transport; f. Local Public Service Agreements; g. community planning and Local Strategic Partnerships; h. consultation and awareness raising across the community. The three roles of the authorities are Estate Managers, Service Providers and Community Leaders and each one is associated with specific sub-areas. The estate management includes the building energy management and the procurement fields. The service provision contains the housing, planning and transport areas. The community leadership is related to the community planning and LSP plus the consultation and awareness

raising at the community level. The same pattern as in the processes section is followed with best case-studies, key resources, checklist questions and the 'hand help' box. To give an idea of checklist questions in the housing and consultation sub-areas, the following examples are provided:

Service provision; Housing: Have you considered whether it is possible to further integrate action on home energy with regeneration or anti-crime work being undertaken in the communities concerned?

Community leadership; Consultation and awareness raising: Do you have processes in place to evaluate the effectiveness of communication techniques and consultation exercises?

It should be noted however, that there is no clear cut distinction between the themes that are described in the three roles of estate management, service provision and community leadership. For instance, the community leader role is quite wide, thus its section incorporates areas like transport, planning and procurement (which are distinct areas in the other two roles) in the field of community planning and LSP. Simply put, these themes are integrated under the same sub-area in the community leader role.

The data collected in the case-study which were related to the content of the toolkit assessed mainly three things: firstly how useful were the checklist questions, the beacon resources and the case studies of the toolkit document. Secondly, which energy topics described in the toolkit, were addressed as a result of participating in the mentoring scheme. Responses revealed good activity regarding the estate management through staff training and monitoring of energy consumption of buildings. At the wide community level, planned actions for the near future were related to the role of LSP and awareness raising. Thirdly, respondents described areas of local energy that should have been given more emphasis in the toolkit according to their opinion. Finally, the survey questions on strategic issues were quite broad and did not refer to specific parts of energy policy like transport, planning etc. This was due to the nature of the survey as described in the research methodology section of Chapter 2.

5.2.4 The Benchmarking Matrix

The fourth part of the toolkit is the benchmarking matrix that helps local authorities to self-assess their performance on sustainable energy. A PDF version of the matrix is available at http://energybenchmark.idea.gov.uk/benchmark/pdf.do (IDeA 2009b). The matrix is based on the CSE Matrix 2005 (CSE 2005) but it is much more detailed. The matrix follows the logic of the toolkit and it has three separate sections for each of the three roles (estate manager, service provider, community leader) of the authority. Each section is divided into two sub-sections that refer to parts two and three of the toolkit described above: the setting of the processes; and delivering at the local level. The *delivering at the local level* function is referred to as *policies and programmes* for the estate management and community leadership, while as *service delivery* for the service provision role. Basically, *service delivery* and *policies and programmes* refer to the same topic, the delivery at the local level. Each sub section has a number of elements that address specific areas of sustainable energy.

The matrix is structured around the topics that are described in the content of the toolkit, but it is more extensive and includes some issues that are not referred to in the toolkit document. For example, issues like travel plans and fleet management are elements of the matrix for the estate manager role although they are found in the *delivering at the local level* part of the toolkit. In this context, the service provision section of the matrix has in its *service delivery* sub-section, a whole theme on economic development, although this topic is not found in the relevant text of the toolkit. Perhaps, the matrix is much more detailed because it has the objective to guide the authorities on very specific topics on sustainable energy, while the text of the toolkit gives an overview and provides links to additional resources. It should be noted that there are some elements in the service provision section of the matrix which do not refer to service delivery, for example, the element of *monitoring and reporting*. Nevertheless these elements with a non-implementation character are very few.

There are diverse issues of sustainable energy which are addressed in the matrix. They range from strategic issues like: leadership and corporate support; energy management on buildings and transport including monitoring of data; behavioural topics like awareness raising and staff training; working in partnerships through community mechanisms such as LSP and LAAs. There are 4 different statuses in

which an authority can see itself in each element of the matrix. Each status is briefly described in he matrix to help the user decide in which one her/his authority belongs. Thus, there is a distinct way to describe each status so that authorities have a level playing field when they are self-evaluated. However, issues of not interpreting the described status similarly and how an authority fits within it arise during the benchmarking exercise (see next section for a schematic part of the benchmarking, as well as for information on the scores the authorities can chose from and the title they (scores) are given). The last column of the matrix directs the user to parts of the toolkit that are related to a particular element of the matrix. This link between areas of action (as defined by the specific element of the benchmarking matrix) and relevant best examples in the text is not found in the approach of the benchmarking matrix of the CSE.

5.3 Data collection and type of analysis for the case-study

5.3.1 Benchmarking exercise

The authorities scored themselves (self-assessment) on elements of energy and climate policy by using the Sustainable Energy Matrix of the toolkit. The development of the benchmarking matrix of the toolkit was based on the Local and Regional Carbon Management Matrix of the CSE. Authorities were benchmarked under three distinct roles on sustainable energy and climate which were the: a. Estate Manager; b. Service Provider; c. Community Leader. Two broad functions of the benchmarking matrix were included for each role. The first referred to useful *processes* for facilitating effective action and the second to the *delivery of services/policies and programmes*. The delivery of services refers to the Service Provider role[12]; the delivery of policies and programmes refers to the roles of the Estate Manager and Community Leader. The number of benchmarking elements in each function varied following descending order from the Service Provider to the Estate Manager and Community Leader roles. The structure of the matrix is summarised in table 6:

Table 6: Structure of the Benchmarking Matrix

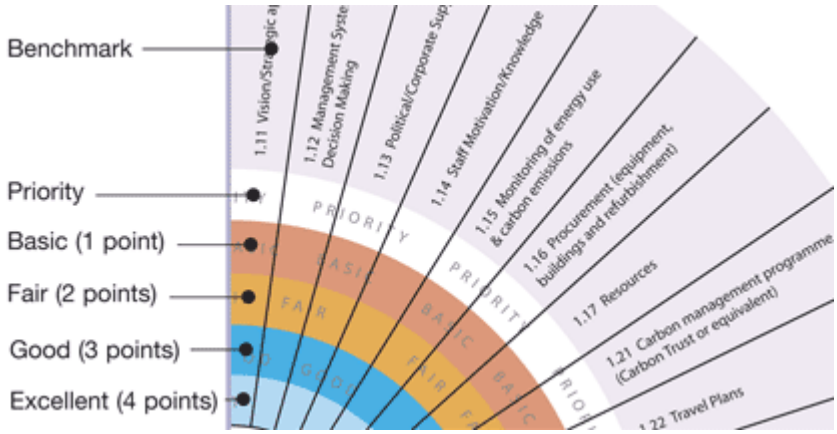
Role of the authority	Section of the matrix	Number of elements
Estate Manager	Setting up processes	7
	Delivery of policies/programmes	6
Service Provider	Setting up processes	8

[12] The appropriate term is ‘service provision’ but it will be referred to as ‘delivery of services’. The rationale is to avoid using a quite large phrase when combined with the part of *delivery of programmes and policies*.

	Delivery of services	6
Community Leader	Setting up processes	4
	Delivery of policies/programmes	4

The authority had to select a score in each element of the matrix which could be: a. Basic (1 point); b. Fair (2 points); c. Good (3 points); d. Excellent (4 points). The authority could be self-assessed also by using the On-Target (wheel) diagram, part of which is shown in figure 2 (IDeA 2007b):

Figure 2: Part of the Wheel Self-Assessment Diagram on the Estate Manager Role



Moving to a higher score in the matrix involves the adoption of an increasingly comprehensive approach on energy and climate. To give an idea of what is a comprehensive climate change strategy that reflects high scores of the benchmarking, the thesis adopts the following definition that is derived from the Climate Change Strategy 2008-2013 of Woking Borough Council which is a beacon council for Sustainable Energy 2005/06 and a beacon council for Tackling Climate Change 2008/09 (Woking Borough Council 2008):

'The aim of this (climate change) strategy is to co-ordinate a wide range of objectives into one *comprehensive* document that can be used by the Council and Woking's residents, businesses, community, groups and others to reduce the Borough's emissions and impact on the environment. The overall objective is to comply with, and exceed where possible, the targets from Central Government and other best international standards[13]'.

[13] The researcher could not find an exact definition of a 'comprehensive climate change strategy at the local level' from a more general source like LGA, IDeA or ICLEI, OECD, United Nations (Human Settlements Programme – UN HABITAT) etc.

The CSE suggests that currently there is little research on the impact that the various elements of its Local and Regional Carbon Management Matrix have on carbon emissions and users should prefer producing non-weighting results. This means that there is no differentiation between the significance that is given to any element of the matrix. A weighting to capture such a feature would involve, for example, multiplying the scores of an element with a coefficient either lower than 1 [for elements of lower significance compared to the typical (baseline) non-weighted elements] or higher than 1 [for elements of higher significance compared to typical (baseline) non-weighted elements] (CSE 2006). Thus, this suggestion from the CSE was adopted when the results of the benchmarking exercise were analyzed in the thesis. Although sustainability experts could be contacted to contribute to weighting, such a provision was out of the remit of the researcher and could only be followed by the IDeA. Descriptive statistics were only applied in the interpretation of benchmarking scores, as the size of the sample was too small to test any hypotheses. This area refers to standard statistics like mean, median and percentage share values but excludes advanced statistical analysis that can test the significance of the findings. These statistical tests are only meaningful if the size of the sample is above a threshold; that was not the case for the sample size of this thesis. The results of the benchmarking analysis are presented in Chapter 6.

5.3.2 Postal and interview surveys

Data were collected from the participating local authorities through postal questionnaires and telephone interviews. The data were analysed to assess the effect of the mentoring scheme on topics of local climate policies like the development of plans and implementation of measures. The issue of how authorities measure the progress of their policies was also considered, to get an idea whether quantitative methods of assessment were already in use, and if not what alternatives were followed (if any). The telephone interviews explored topics not covered in the postal questionnaires. Some were of strategic nature like the impact of the scheme on how energy and climate policy is perceived within the council, and others on policy issues like the council's policy on the +10% renewable energy target, and the influence that the scheme had on implementing measures. The degree of the scheme's influence on policies was asked about in the postal questionnaires (Likert scale), but the telephone interview was more open with respondents being able to describe their point of view. Telephone interviews were conducted rather than face to face interviews because they

required fewer resources and time. This was particularly the case for this study where most of the authorities interviewed where distributed geographically in distances far away from Leicester. Each interview lasted approximately 20 to 40 minutes and the answers were typed at the time of the conversation in a Word file. Coding of the data was not conducted as they were straightforward and not extended enough to allow such a kind of analysis. Six out of the seven beacons, four out of the seven mentee and two out of the six stand alone authorities responded to the postal survey. Methods used to increase the response rate included reminders to the participants by emails and telephone calls. The reminders were sent to those participants that had not responded within a few weeks by the time they received electronically the postal survey. All twenty authorities participated in the telephone interviews.

Marshall and Rossman (1999) refer to the external validity of a qualitative research as 'the degree of transferability and generalization of the study's findings to other populations, settings and treatment arrangements'. They argue that this is seen by some analysts as a weak point of the qualitative research. To counterbalance this challenge, a researcher can make clear and available the data collection method and its analysis. It is the responsibility of other analysts that work in the same or similar domain to determine whether the findings of the study can be transferred to other populations and cases. A common method of enhancing the generalization of the findings is to gather data using more than one method (Marshall and Rossman 1999). This is suggested also by Ritchie and Lewis (2003): they argue that triangulation where data are collected with different methods increases the external validity of the findings.
As a result, the mixed (triangulation) method of data collection from postal questionnaires and telephone interviews, adopted in the thesis, increases the generalization and external validity of the research findings.

5.4 Data issues relevant to the research methodology

This thesis expores key policy and strategic issues on sustainable energy and climate policy through a case-study of transfer of expertise from successful to less successful local authorities. Key topics in relation to the applied research methodology are presented below. These issues arise from the opportunities and constraints to fulfil a broad objective of the thesis on policy analysis. This is to define the baseline position of the authorities on climate change and explore barriers and key success factors for managing local greenhouse gas emissions:

- The IDeA which is a key governmental agency for improving the performance of UK local authorities organised a pilot scheme of expertise transfer on climate change between successful and less successful local authorities. The researcher had the opportunity to fulfil objectives of the thesis by working on the evaluation of this scheme. The administration of the scheme by the Improvement and Development Agency adds value to the case-study of the thesis.
- The sample of the participating authorities and the local authority practitioners involved were determined by the Improvement and Development Agency. Since the case-study had a pilot nature, twenty authorities participated. For that reason, advanced statistical analysis of the collected data was not attempted as it would not be meaningful. However, a mixed use data collection methodology of postal questionnaires and telephone interviews was adopted. This approach increases the external validity of the findings.
- The nature of the survey was straightforward and simple due to time constraints to deliver the evaluation in due time and as a result of the objective of this thesis: a scoping study to explore key strategic and policy issues on climate policy that can be researched in-depth in future studies. As a result, the responses were critically synthesised to highlight interesting and useful points and additionally produce synthesised conclusions from responses of all authorities.
- The authorities were self-benchmarked and the researcher analysed the responses to define their baseline position. The responses were not weighted to capture potential differentiated significance of the benchmarking elements. This is the advice from the Centre for Sustainable Energy n the use of its benchmarking energy matrix. The Sustainable Energy Matrix of the Toolkit is based on the Centre for Sustainable Energy matrix, but it is considerably more extensive and detailed.
- Very little data on the benchmarking exercise are missing as only few authorities did not provide responses on all elements of the benchmarking matrix. These missing data do not affect the findings from the benchmarking as they are not very significant.

All authorities were contacted by the researcher in October 2008 to identify whether the measures agreed in the mentoring scheme (December 2006 to July 2007) have been

implemented or planned as scheduled. The researcher asked for an explanation, in case the commitments arising from the case-study had not been achieved yet. Reminders were also sent about this inquiry, but no authority replied. The explanation offered by the researcher is that this was due to work commitments.

5.5 Analysis of emissions data for the local authorities of the case-study

Chapter 4 revealed that there are insufficient years of reliable data for a historical analysis of the energy related carbon emissions of UK local authorities. However, since there are reliable data for 2005, 2006 & 2007 and the case-study was carried out from December 2006 to May 2007, it would be useful to calculate emissions for these years and make brief comments that might arise from the numbers. Figures 3 & 4 of this section present the per-capita carbon dioxide emissions for the case-studied authorities and the percentage changes in these emissions between years 2005 & 2006, and 2006 & 2007. The authorities are grouped as beacons (mentor), mentee and stand-alone. The authorities are presented with this flow as the figure is read from the left to the right, and their sequence is arbitrary. The data have been calculated by using the energy statistics for 2005, 2006 and 2007. The revised data for 2005 and 2006 have been used where major changes were applied for road transport.

Table 7 which follows summarizes information on the emissions factors used and the conversion factors from tones to litres for the road transport data. The road data were split into diesel and petrol consumption as different emission factors are used for each of these energy sources. The emission factors are taken from Defra's source: 'Guidelines for Company Reporting on Greenhouse Gas Emissions' (Defra 2005), and are given in carbon dioxide equivalent. The conversion factors from tones to litres for diesel and petrol have been taken from the International Transport Statistics Database or the International Road Assessment Program (iRAP 2009). The diesel and petrol data were converted from tones as given in the UK statistics, to litres in order to apply Defra's emission factor which refers to carbon dioxide per litre of diesel or petrol fuel.

Table 7: Emissions and Fuel Conversion Factors for Gas, Electricity, Diesel & Petrol

Energy source	Emission factors (CO_2 eq./KWh)	Conversion factors (tones to litres)
Mains Gas	0.00019 tonnes CO2 eq/KWh	
Mains Electricity	0.00043 tonnes CO2 eq/KWh	
Diesel	0.00263 tonnes CO2 eq/litre	1,203

Petrol	0.0023 tonnes CO2 eq/litre	1,354

Source: Defra (2005); (iRAP 2009)

Figures 3 & 4 on per-capita carbon dioxide emissions and % change on emissions are presented below:

Figure 3: Per-capita carbon dioxide emissions from gas, electricity & road transport for 2005, 2006 & 2007 for the case-studied authorities

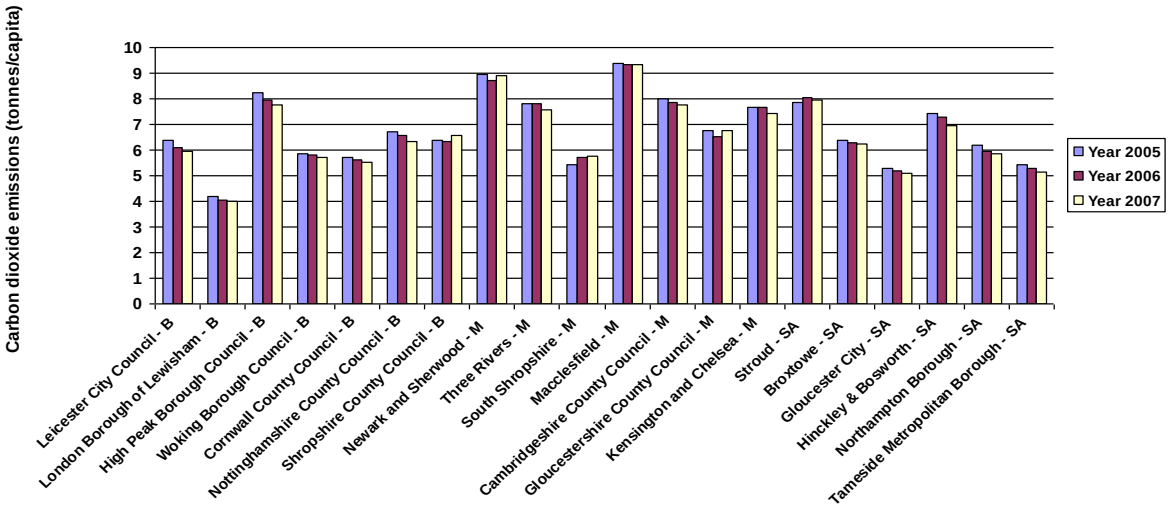


Figure 3 shows that all beacons but Shropshire County Council reduced their emissions consecutively from 2005 to 2006 & 2007. Perhaps this is because the beacons are already advanced on sustainable energy development. For mentee authorities a trend is not that clear, with authorities either reducing and then increasing emissions, or either increasing or reducing them from year on year. Further comments require a longer time series of data and in-depth policy analysis. All stand-alone authorities but Stroud reduced their emissions year on year. This is interesting since these authorities are now starting their efforts on sustainable energy. However, due to the small sample of the size, reliable conclusion cannot be drawn. Again, explanations require more longitudinal data, and in-depth analysis.

Figure 4: Percentage change of per-capita carbon dioxide emissions for 2005, 2006 & 2007 for the case-studied authorities

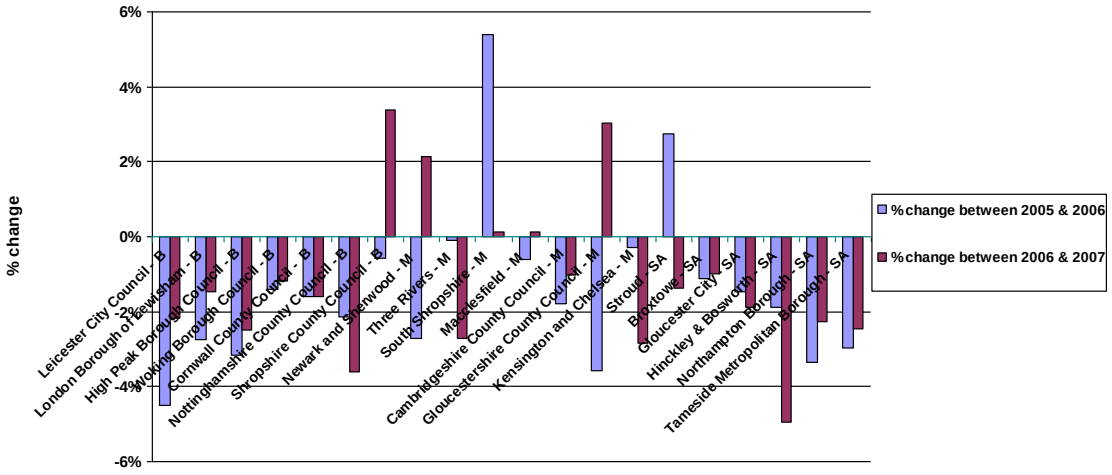


Figure 4 shows that for five beacons the % reduction of emissions is lower between years 2006 & 2007 compared to the reduction between years 2005 & 2006. Nottinghamshire County Council's percentage reduction follows the reverse order, Cornwall County Council' reduction stays the same, and Shropshire County Council increases its emissions between 2006 & 2007 following a reduction between 2005 & 2006. It seems that beacons have a greater difficulty in reducing emissions. Defra suggests that authorities who have a long history on managing emissions have achieved the 'low hanging fruit' easy reductions based mainly on energy efficiency projects. Thus, it is more difficult to reduce emissions even further (Defra 2008h). However, it is not clear whether this is the reason why the beacons have lower % emissions reduction as revealed in figure 4, since this is based on comparing only two sets of years. For mentee authorities there is not any trend on the emissions changes and there are various combinations of increases and decreases. Finally, the pattern for three stand-alone authorities follows Defra's comment on the 'low-hanging fruit', two of them reduce their emissions more between years 2006 & 2007 compared to 2005 & 2006, while Stroud increases its emissions and then reduces them. Further analysis on all cases requires an in-depth study.

5.6 Conclusions

Data on the baseline position of the authorities of the case-study were collected through the benchmarking matrix of the toolkit. The data were broken-down according to the authority's role on sustainable energy and to the two areas of *processes* and *delivery of services/policies*. A postal survey was used for data collection in the case-study and twelve out of the twenty authorities filled in a questionnaire. Telephone interviews with all twenty authorities were conducted to get data on issues not covered in the postal survey and to increase the validity of the findings by contributing to triangulation on data collection. Data analysis based on the energy statistics for 2005, 2006 and 2007 shows that most beacons and stand-alone authorities have reduced carbon dioxide emissions consecutively with the rate of emissions reduction declining being declined. For mentee authorities there are not clear trends identified. Reliable explanation on causes of emission changes requires more longitudinal data and in-depth policy analysis. The next Chapter presents the findings of the case-study of expertise transfer on sustainable energy between the successful and less successful local authorities.

6. Findings from the Case-Study

The sections 6.1 and 6.2 of this Chapter present findings from the benchmarking exercise of the less successful authorities (mentee and stand alone). Section 6.3 contains findings from the postal and telephone surveys from all authorities, including the successful ones (mentors). This sequence of presentation is followed to give an idea of the baseline position of the authorities on energy and climate before topics on policies, measures, barriers to action etc. are presented.

6.1 The baseline position of the less successful local authorities

6.1.1 Frequency of positions in the benchmarking matrix

For each of the mentee and stand-alone authorities, the frequency of positions in the benchmarking matrix for the Estate Manager, Service Provider and Community Leader roles were identified. The frequency number refers to how many elements of a specific section of the benchmarking matrix received a particular position which could be Basic, Fair, Good or Excellent. These positions are associated with a specific benchmarking score: Basic gets 1 point; Fair gets 2 points; Good gets 3 points; and Excellent gets 4 points. There are six benchmarking sections that arise from the various combinations of local authority roles (Estate Manager, Service provider, Community leader) and functions (Processes or Delivery). Thus if, for instance, a local authority rated 10 elements of a particular benchmarking section as Fair, then the frequency of its Fair position for this section of the matrix is 10 and this number (described as 'times' on the tables) is shown in the relevant table. The results of the frequency of positions are presented in tabular form in tables 8 & 9. The average score of an authority in a benchmarking section is calculated by multiplying the frequency of the positions with their relevant point and dividing the summed from all frequencies by the total number of the frequencies. The authorities were grouped together as either District Authorities or Unitary Authorities/London Boroughs/County Councils. The rational for this categorisation is based on the following points:

- Unitary Authorities and London Boroughs have very similar responsibilities in housing, social, services, local transport, local planning, waste management, economic development etc. Additionally, both types can impose and collect their own Council Tax (London 2008, City Mayors 2007).
- County Councils have major responsibility in social services and education. However, they have a key role in other areas such as economic development,

public transport and waste disposal (City Mayors 2007). Therefore, they have similar responsibilities to Unitary Authorities and London Boroughs. In addition, they raise part of their funding by billing district authorities in their two tier system (City Mayors 2007). This is another similarity with Unitary/London Boroughs.

- District authorities have responsibilities in environmental, planning, waste collection and housing. However, they differ a lot in the total population compared to Unitary/London Borough/County Councils. According to the 2001 Census, the population of a County varied from around 300,000 up to 2,500,000. Unitary Authorities were normally above 100,000/150,000 (with one outlier of 35,000) and most of London Boroughs were above 200,000. District Authorities had a comparable population to Unitary Authorities in some cases, but very frequently the number was below 100,000 (Office for National Statistics 2008b).

Comparison across local authorities is not attempted as each one has its own strengths and weaknesses that influence its ability to act. This approach is endorsed by Defra (2008b) which suggests that it is not advisable to compare local CO_2 emissions statistics across local authorities even though the 2005 and 2006 estimates have gained National Statistics Status. Tables 8 & 9 that follow demonstrate the frequencies of position in the toolkit's benchmarking matrix on its two broad functions of *processes*; *delivery of services/policies* for each of the three roles of the less successful authorities (Estate Manager/Service Provider/Community Leader).

Mentee Authorities

Table 8: Frequency of Position in the Benchmarking Matrix for Mentee Authorities																
Frequency of position in the matrix (times)																
Section of the Benchmarking Matrix	**District Authorities**															
	Newark and Sherwood				**Three Rivers**				**South Shropshire**				**Macclesfield Borough**			
	Basic	Fair	Good	Excellent	Basic	Fair	Good	Excellent	Basic	Fair	Good	Excellent	Basic	Fair	Good	Excellent
Es. Man. – Proc.	1	4	2			3	3	1	5	2			1	5	1	
Es. Man. – Del.		2	3			1	3		3		1		4	1		
Ser. Pr. – Proc.		5	3		1	1	6		2	3	2	1	5	1	1	
Ser. Pr. – Del.			6	8		4	8	2	2	5	2	2	5	7	1	
Com. L. – Proc.	1	2	1			3	1		1	2		1	3	1		
Com. L.- Del.	2	2				2	2		3	1			4			
	Unitary Authorities/London Boroughs/County Councils															
	Cambridgeshire County Council				**Gloucestershire County Council**				**London Borough of Kensington and Chelsea**[14]							
Es. Man. – Proc.	2	3	2		2	4	1		1	3	3					
Es. Man. – Del.	2	3			1	4	1		1	4	1					
Ser. Pr. – Proc.	1	5	2		2	3	1	1	4	3	1					
Ser. Pr. – Del.	2	3	1		2	5				6	9	1				
Com. L. – Proc.		1	1		1	2		1	1	3						
Com. L.- Del.	2	1	1		2	2			3	1						

Note: Es. Man. = Estate Manager, Ser. Pr. = Service Provider, Com. L. = Community Leader, Proc. = Processes, Del. = Delivery of services/Implementation of programmes and policies

[14] London Boroughs are in effect Unitary Authorities (Sutton 2008), although legally they are still under a two-tier system where the Greater London Authority (GLA) co-ordinates them. However, GLA is not categorized as a County Council (Vision of Britain 2008).

Table 9: Frequency of Position in the Benchmarking Matrix for Stand-Alone Authorities								
Frequency of position in the matrix (times)								
Section of the Benchmarking Matrix	**District Authorities**							
	Stroud				**Broxtowe Borough**			
	Basic	Fair	Good	Excellent	Basic	Fair	Good	Excellent
Es. Man. – Proc.		4	3			5	2	
Es. Man. – Del.		2	1			4	1	
Ser. Pr. – Proc.	2	3	2	1	1	5	2	
Ser. Pr. – Del.		5	5	5	1	8	5	2
Com. L. – Proc.		2	1	1	1	2	1	
Com. L.- Del.	1	1	2		1	2	1	
	Gloucester City				**Hinckley & Bosworth Borough**			
Es. Man. – Proc.		2	5		3	4		
Es. Man. – Del.		4	1	1	4			
Ser. Pr. – Proc.		4	3	1	3	4	1	
Ser. Pr. – Del.		8	6	2	2	6	2	4
Com. L. – Proc.		3		1		2	2	
Com. L.- Del.	1		3			3	1	
	Remaining District Authority - Unitary Authorities/London Boroughs/County councils							
	Northampton Borough				**Tameside Metropolitan Borough (Unitary)**			
Es. Man. – Proc.	5	2				2	4	1
Es. Man. – Del.	4				1	2	2	1
Ser. Pr. – Proc.	8				3	2	2	1
Ser. Pr. – Del.	7	3	3		3	6	7	
Com. L. – Proc.	3	1				2	2	
Com. L.- Del.	4				1	2	1	

Note: Es. Man. = Estate Manager, Ser. Pr. = Service Provider, Com. L. = Community Leader, Proc. = Processes, Del. = Delivery of services/Implementation of programmes and policies

In some cases presented in tables 8 & 9, the times an authority scores itself in a particular section of the matrix is not the same across all authorities of that administrative type. For example, this is the case with District authorities in table 6. This is due to missing data; that is data that were not reported from the local authorities when they completed the benchmarking exercise.

6.2 Visualizing the performance of the local authorities and associated findings

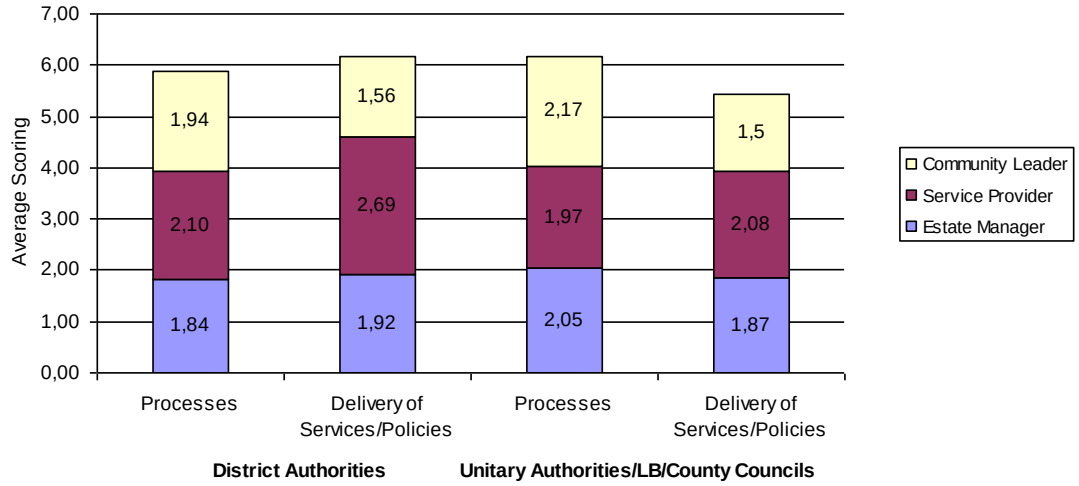
6.2.1 Introduction

When the less successful authorities undertook the benchmarking exercise during the case-study (pilot scheme) the results were not dependent on whether they were either mentee or stand-alone, thus figures are presented from analysis that combines these types of authorities. In the pilot scheme, the mentee authorities were those that received interpersonal mentoring, thus they received more well-rounded advice compared to stand-alone authorities (see reference to Keiner and Kim (2008) and Dunwoody (2007) in section 5.1). This is one factor that could differentiate the approach of mentee authorities from that of stand-alone on climate policy. Therefore, mentee and stand alone authorities are also analysed separately, so that the benchmarking results will serve as a reference point upon which future performance will be compared.

Various types of analysis based on different combinations of authority type (mentee/stand alone), administrative type (District Authorities/Unitary Authorities-London Boroughs-County Councils), role of authority (Estate Manager, Service Provider, Community Leader) and function of the benchmarking matrix (processes; delivery of services/policies) were carried out. The results are presented in figures 5 to 9. Calculations of the average scorings (from all relevant authorities) are based on data from tables 8 and 9 that contain the frequencies of position in the benchmarking matrix for each authority. The scorings are also depicted on the figure. No weighting of the benchmarking scores of the individual elements of the matrix has been adopted as described in the Research Methodology. Authorities are not compared to each other as each one has its own circumstances, for example Defra suggests avoiding such an approach for local CO_2 emissions estimates (Defra 2008b). In the title of the figures, the term *role* refers to the three roles of Estate Manager/Service Provider/Community Leader of the authorities. The term *function* refers to the benchmarking sections of *processes,* and *delivery of services/policies*. The term *administrative type* refers *to the District – Unitary Authorities/London Boroughs/County Councils* split of the authorities. Figures are presented first separately for mentee and stand-alone authorities and then combined.

6.2.2 Mentee authorities

Figure 5: Average Scoring from Mentee by Role, Function and Administrative Type



Looking at the District Authorities only

Figure 5 shows that the scores of Processes in the Community Leader role are marginally below Fair but the Delivery of Services/Policies scores are more than moderately below Fair. This shows a higher difficulty in implementing policies at community level compared to setting up the processes. At the Service Provision, the authorities are more effective in implementing policies (score between Fair and Good) compared to setting up the processes. In the Estate Manager, both Processes and Delivery are between Basic and Fair and the Delivery score is significantly lower compared to that in the Service Provision. Overall, the Community Delivery scores the lowest despite having the middle Processes score. The Processes is the lowest in the Estate Management although theoretically this is the role in which the authority has the highest influence.

Looking at the Unitary Authorities/London Boroughs/County Councils only

Figure 5 shows that the Processes in the Community Leader role are between Fair and Good but the Delivery of Programmes scores between Basic and Fair. As in District Authorities, these authorities have greater difficulty in implementing policies at community level. At the Service Provision, the authorities have higher effectiveness in implementing policies compared to setting up the Processes, and the Delivery of Services scores between Fair and Good. In the Estate Management, Processes are marginally above Fair, but Delivery is below Fair. This delivery score is moderately

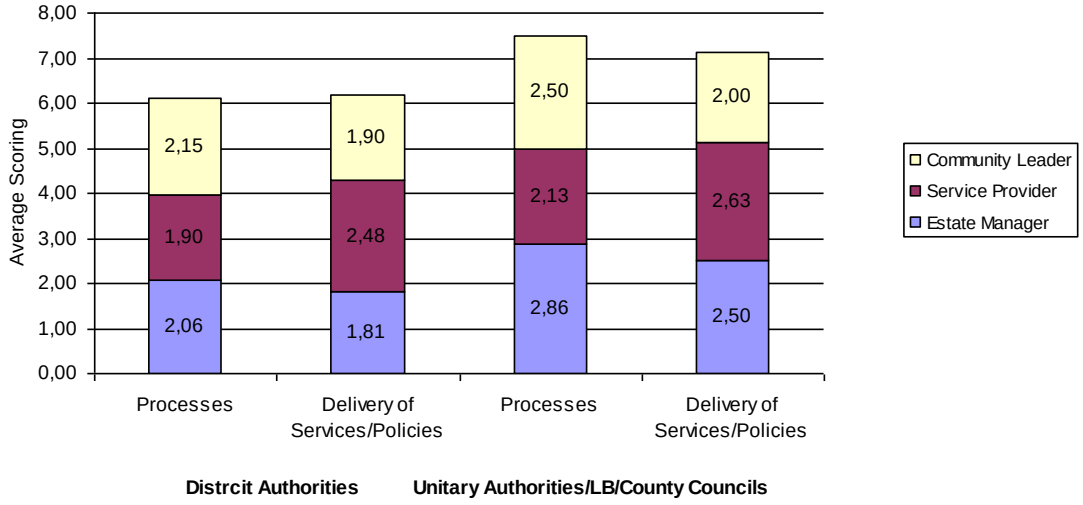
lower compared to that in the Service Provision. Overall, the Community Delivery scores the lowest despite having the highest Processes score.

Comparing District Authorities with Unitary Authorities/London Boroughs /County Councils

This comparison is attempted although the two types of authorities had different number of replies. The reason is this brief analysis aims to highlight key issues when comparing the two administrative types rather than reaching detailed and solid conclusions. In addition, the number of the replies from each administrative type is not the same but it is quite similar. Figure 5 shows that in the Delivery at community level, both administrative types show almost the same performance which is between Basic and Fair, although the relevant Processes are moderately higher for Unitary Authorities/London Boroughs/County Councils. A similar pattern is found for the Estate Manager role. In the Service Provision, the District Authorities have a much better score in the Delivery, although Processes are comparable. The best Processes score is that of Community Leader of the Unitary Authorities/London Boroughs/County Councils, and the best Delivery score is that of the Service Provision in the District Authorities. Although mentee authorities have the best score in the Processes of the Community Leader role, the relevant Delivery score is the lowest. This shows the high difficulty in engaging with the wider community.

6.2.3 Stand-alone authorities

Figure 6: Average Scoring from Stand-alone by Role, Function and Administrative Type



Looking at the District Authorities only

Figure 6 shows that the Processes in the Community Leader role are moderately above Fair but the Delivery of Programmes scores moderately below Fair. The Delivery of the Community Leader role scores significantly below that of the Service Provider, despite having the best Processes score. As before, these authorities have greater difficulty in implementing policies at community level. In the Service Provision, the authorities have greater effectiveness in implementing policies compared to setting up the processes, and Delivery scores between Fair and Good. In the Estate Management, Processes are marginally above Fair, and Delivery is moderately below Fair. This Delivery score is considerably lower compared to that in the Service Provision.

Looking at the Unitary Authorities/London Boroughs/County Councils

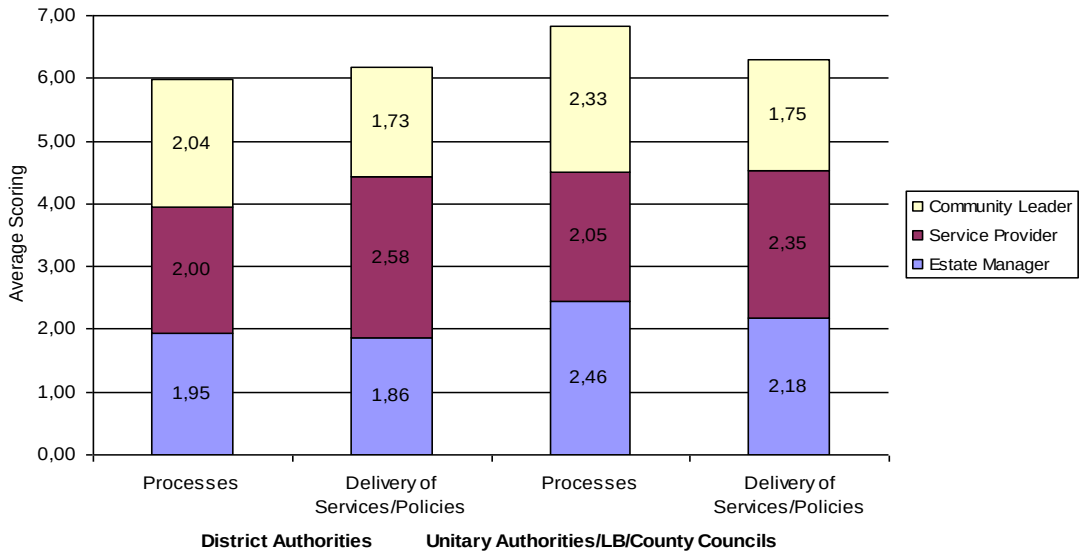
Figure 6 shows that the Processes in the Community Leader role are just in the middle between Fair and Good but the Delivery of Policies scores exactly Fair. As in District Authorities, these authorities show greater difficulty in implementing policies at community level. In the Service Provision, the authorities have greater effectiveness in implementing policies compared to setting up the Processes, and the Delivery of Services scores between Fair and Good. In the Estate Management, Processes are marginally below Good, and Delivery is just in the middle between Fair and Good. This Delivery score is moderately lower compared to that in the Service Provision. The Community Delivery scores the lowest despite having the middle Processes score (when comparing all three roles), and the Processes score is the highest in the Estate Management but its Delivery is in the middle.

Comparing District Authorities with Unitary Authorities/London Boroughs/County Councils

Figure 6 shows that in the Delivery at community level, Unitary Authorities/London Boroughs/County Councils show moderately better performance compared to District authorities, although their relevant Processes are considerably higher. In the Service Provider and Estate Manager roles the Unitary Authorities/London Boroughs/County Councils have a better performance in both processes and delivery. The best Processes and Delivery scores are those of the Estate Manager and Service Provider roles respectively of the Unitary Authorities/London Boroughs/County Councils. The above analysis could be the starting point for a discussion on looking in more depth at the reasons for the initial benchmarking findings. Such an investigation could be carried out by conducting in-depth case studies on separate authorities.

6.2.4 Combined mentee and stand-alone; scoring by role, function and administrative type

Figure 7: Average Scoring from Mentee and Stand-Alone (combined) by Role, Function and Administrative Type



Looking at the District Authorities only

Figure 7 shows that the Processes in the Community Leader role are marginally above Fair but the Delivery of Programmes scores moderately below Fair. This shows a particular difficulty in implementing policies at community level. In the Service Provision, the authorities have greater effectiveness in implementing policies compared to setting up the Processes, and this Delivery scores between Fair and Good. In the Estate Management, both Processes and Delivery are between Basic and Fair and this Delivery score is considerably lower compared to that in the Service Provision. The Community Delivery scores the lowest despite having the highest Processes score. The Processes is the lowest in the Estate Management although theoretically this is the role in which the authority can have the highest influence.

Looking at the Unitary Authorities/London Boroughs/County Councils only

Figure 7 shows that the Processes in the Community Leader role are between Fair and Good but the Delivery of Programmes scores between Basic and Fair. As in District Authorities, these authorities have a high difficulty in implementing policies at community level. In the Service Provision, the authorities have greater effectiveness in implementing policies compared to setting up the Processes, and this Delivery scores between Fair and Good. In the Estate Management, both Processes and Delivery are between Fair and Good and this Delivery score is moderately lower compared to that in the Service Provision. The Community Delivery scores the lowest despite having the

middle highest Processes score. The Processes score is the highest in the Estate Management but its Delivery is in the middle when all roles are compared.

Comparing District Authorities with Unitary Authorities/London Boroughs/County Councils

Figure 7 shows that In the Delivery at community level, both types show almost the same performance which is between Basic and Fair, although the relevant Processes are moderately higher for Unitary Authorities/London Boroughs/County Councils. In the Service Provision, the District authorities have moderately better performance with Processes in both administrative types scoring similarly. The best Processes score is that of the Estate Management of the Unitary Authorities/London Boroughs/County Councils, and the best Delivery score is that of the Service Provision of the District Authorities.

6.2.5. Combined mentee and stand-alone; scoring by role and function

Figure 8 compares average scores from both administrative types of authorities split by role and function:

Figure 8: Average Scoring from Mentee and Stand-Alone (combined) by Role and Function

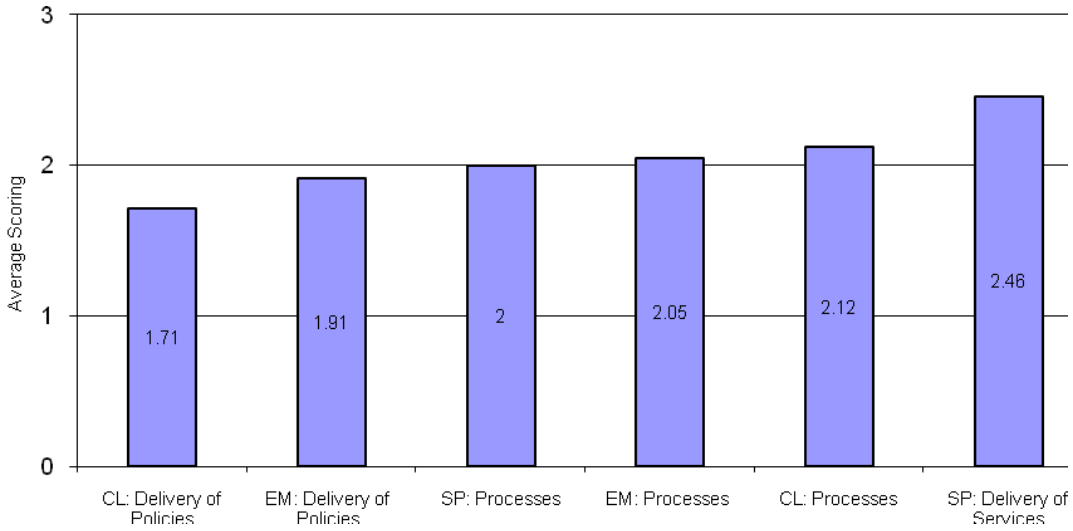


Figure 8 shows that the Delivery of Policies of the Community Leader role has the lowest score of 1,71 followed by the Delivery of Policies in the Estate Manager role. The Processes in all roles score at or marginally above 2 (base for Fair), while the Delivery of Services (service provision) is approximately in the middle between Fair and Good at 2,46.

6.2.6 Combined mentee and stand-alone; scoring by role

Figure 9 compares average scores from both administrative types of authorities split by role:

Figure 9: Average Scoring from Mentee and Stand-Alone (combined) by Role

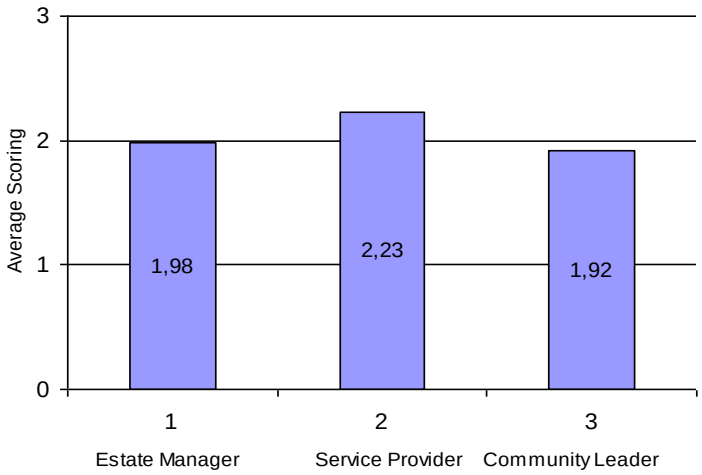


Figure 9 shows that when administrative types and functions are combined, the best score is that of the Service Provider role at 2,23 between Fair and Good, followed in descending order by the Estate Manager and Community Leader roles which score at 1,98 and 1,92 respectively that is below Fair.

6.2.7 Conclusions from the benchmarking exercise

The results of the benchmarking analysis show that the authorities have a significant difficulty in delivering services and policies at the community level. This is expected since it is very challenging for local governments to engage with the wider community on sustainable energy and climate policies. Also, in many cases the scores in the Estate Manager role are lower compared to those of the Service Provider. This is in contrast to the fact that estate management is less complex compared to the provision of services, as in the latter the number of stakeholders involved increases. The Processes tend to score higher compared to the delivery of services/policies. The major conclusion of the analysis is that authorities should place more emphasis on the delivery of services and policies, especially in the Estate Manager and Community Leader roles. The next section presents the findings of the case-study from the postal and telephone surveys.

6.3 Findings from postal and telephone surveys

6.3.1 Introduction

The postal survey consisted of a series of questions related to the process of the mentoring exercise and the content of the toolkit. The estimated time of completion of the survey was approximately 20 minutes. The postal survey was sent to the key officers of the authorities on the 27th of April 2007 by electronic mail as a PDF file. These key persons had been assigned responsibility by their authority for carrying out the scheme, so they were those to whom the postal survey was sent. Their contact details were taken by IDeA. The participants were asked to print out the questionnaire, complete it, and return it by post. The postal survey was completed by six mentor, four mentee and two stand-alone authorities, totalling twelve out of twenty authorities. The telephone interviews with all twenty authorities took place between 25 April 2007 and 02 May 2007. Templates of the postal and telephone interview questionnaires that were used for the mentor, mentee and stand-alone authorities are presented in Appendix 4. In the next sections, the results from the survey and the interviews are presented. Along with the main issues referenced in the introduction of the Chapter there are some additional topics that are presented first. These include the following:

- who used the toolkit
- snapshot answers on administrative issues, the usefulness of various elements of the scheme, availability of team support to act, and the contribution of the scheme to policy development and implementation
- comments on the format of the toolkit and whether it was user-friendly
- benefits of using the toolkit

6.3.2 Expertise and job description of chief officers

Each local authority had one main contact person that was selected by the IDeA. Her/his contact details were passed to the researcher by the IDeA; this was the person that was interviewed and who filled in the survey. The same person completed both types of survey, except for one mentor and one mentee authority. More details of the role of this person and the others who worked on the toolkit within their authority were collected. In three of the mentor authorities, the person in charge (or a majority of the people working on it) worked for an outside energy agency or a coalition of authorities. In all the other authorities, an officer was in charge. There were housing and planning officers leading the toolkit project in the mentee and stand-alone authorities, whereas

the officers in charge in the mentor authorities were more likely to be energy and sustainability managers. It appears that these positions have not been created widely in the stand-alone and mentee authorities. The position and role of a respondent could determine to a certain degree her/his approach on the survey and as a consequence the given responses. However, this factor and its influence on the responses were not studied in the thesis as it was out of the objectives of the case-study and the thesis itself. Several mentee authorities had cabinet politicians, corporate management and senior management involved with the toolkit. The mentor authorities appeared to have had fewer people involved in the project (with the exception of one authority) and did not mention senior management as much as the mentee authorities. The stand-alone authorities did not mention working with senior management in their council.

6.3.3 Snapshot responses on key issues

The responses of the three types of authority are compiled in tables 10, 11 and 12. Many mentor authorities found parts of the toolkit very useful, but half felt that the beacon resources and case studies were not very useful. The mentee authorities found most parts of the toolkit useful or very useful, whereas the stand-alone authorities thought that many parts of the toolkit were only moderately useful.

Table 10: Responses of the Six Mentor Authorities on Key Issues

Question	Response
Detail of reading of toolkit	Half read all in detail, others only parts
Time spent reading toolkit	2-3 hours
How many read toolkit in first response?	Half the authorities- One person read it initially Half- Whole team read it
Toolkit ease of understanding	Easy to understand (one didn't find it easy)
Interactive CD	All found useful
Toolkit relevant to authority	Moderately or very relevant
Self assessment question useful guidance	Three very useful, one moderately useful and two not at all useful
Beacon resources and case studies	Half- very useful Half- not very useful
On Target Diagram	Moderately to very useful in guiding authorities
Barriers to success of toolkit	All but two found no barriers
Support in their team to act	All felt there was support
Need for other resources	All but one believe need more resources
Preparedness of mentors	Four moderately prepared, one very prepared and one not very prepared

Table 11: Responses of the Four Mentee Authorities on Key Issues	
Question	**Response**
Detail of reading of toolkit	Most read in detail
Time spent reading toolkit	Two less than 3 hours, two more than 3 hours
How many read toolkit in first response?	One person read all of it as 1st response, in one authority the whole team read it initially
Toolkit ease of understanding	Moderately easy to understand
Interactive CD	All but one found very useful
Toolkit relevant to authority	Moderately or very relevant
Self assessment question useful guidance	Useful
Beacon resources and case studies	Useful
On Target Diagram	Useful or very useful
Barriers to success of toolkit	All but one see barriers
Support in their team to act	All felt there was support
Need for other resources	All but one see need for more resources
Received explanation of toolkit by mentor authority	All but one
Received help by mentor upon first approaching toolkit	All but one
Toolkit and mentoring contributed to development of action plan	One - very much, two - moderately, one – not very much
Toolkit and mentoring contributed to implementation of action plan	Two – very much, one - not very much, one – not at all

Table 12: Responses of the Two Stand-Alone Authorities on Key Issues	
Question	**Response**
Detail of reading of toolkit	Read all or most of it in detail
Time spent reading toolkit	2-3 hours or more than 3 hours
How many read toolkit in first response?	One person read all or part of it
Toolkit ease of understanding	Moderately easy to understand
Interactive CD	Moderately useful
Toolkit relevant to authority	Moderately or very relevant
Self assessment question useful guidance	Moderately or very useful
Beacon resources and case studies	Moderately or very useful (case studies less useful)
On Target Diagram	Moderately useful
Barriers to success of toolkit	All see barriers
Support in their team to act	All felt there was support
Need for other resources	All see need for more resources
Clarity without external support	Moderately or very clear
Toolkit and mentoring contributed to development of action plan	Moderately or very much
Toolkit and mentoring contributed to implementation of action plan	Moderately or unsure

The responses about how much the toolkit contributed to the development and implementation of an action plan are derived from relevant questions of both postal and telephone surveys. All other information in tables 10, 11 & 12 have been taken from the postal questionnaires as relevant questions were not asked in the telephone interviews. Six out of the thirteen mentee and stand alone authorities responded in the postal questionnaire survey, thus the relevant information in tables 11 & 12 are from around a 45% response rate.

6.3.4 Comments on the usefulness of the interactive CD format

Responses from the authorities are given separately for mentor, mentee and stand-alone. Comments that fall into more than a single above-mentioned authority type are then presented.

Mentor authorities (Beacon Councils)

All but two of the mentor authorities said that they liked the format and found it useful. There were comments about putting the bench-marking exercise at the beginning and putting in room for comments in the self-assessment exercise. One mentor found that there was not enough help on the CD to instruct the mentors on how to go about the mentoring. Also, one mentor authority stated that the CD is possibly more useful to any authority when they are not in direct contact with any mentors.

Mentee authorities

Only one authority didn't like the format. Most said that being able to fill in the self-assessment electronically would be preferable, whereas one council said that they would prefer a printed version to fill-in instead to an electronic one.

Stand-alone authorities

The stand-alone authorities mentioned that the On Target diagram should have been presented at the start.

Comments that fall into more than a single authority type

Most authorities thought that the on-screen nature was very good and easy to navigate as well as an excellent reference tool with easy links to follow. However, it contained so many documents that the first read could take very long and the reader could easily get distracted or be uncertain whether the information was incidental or essential. Many authorities would appreciate a more interactive screen in order the self assessment been carried out directly within the CD package via a link. Some authorities mentioned

that they had to spend too much time having to catch up and translate the vast array of abbreviations used in the toolkit.

6.3.5 Benefits of using the toolkit

The results from the benchmarking and target diagram can be used as a way of formally presenting the authority's results to staff and beyond. In addition, the benchmarking matrix and On-Target diagram were quoted by most local authorities as being the most useful elements of the toolkit: they divided areas of work into bite-sized chunks, into a checklist which highlighted priority. It gave them a wider perspective, enabling them to look beyond the council itself and it promoted stimulating discussions within the mentor authorities. With respect to the scoring system of the matrix, it was mostly well accepted, meaning that the authorities could concentrate on their weak scores and attempt to work their way towards the higher scores at the centre of the On Target diagram. The specific examples of the toolkit were helpful for the mentor authorities to use their knowledge and experience to guide the mentee authority once they had identified priority actions. For some mentee and stand-alone authorities the toolkit organised thoughts rather than raised the profile of climate change mitigation, and many see the greatest changes still to come as the toolkit triggers an ongoing process of improvement. Another benefit was that work usually done in separate departments was brought together in one strategy.

For the mentor authorities the toolkit did not add much to raising the profile of energy and climate policy or changing their established approach as these councils already had comprehensive relevant policies. However, the toolkit and the interaction with the mentee authorities highlighted issues to mentor authorities that needed more attention within their policies such as the delivery of services and fuel poverty. Nevertheless, the mentors stated that the toolkit did not add to their knowledge on the potential areas of improvement. Two authorities stated that it was difficult to distinguish between Fair and Good performance on the matrix while what should matter more is a qualitative analysis behind the facts and not an exact scoring of the performance. Finally, some authorities suggested that the toolkit did not make clear the different responsibilities that the various authorities have according to their administrative type (county council, district council etc.). This would be helpful especially when the benchmarking matrix was completed as various parts of the toolkit were not relevant to some authorities. It is interesting to note that most of these objections were raised by mentor authorities,

while a large proportion of the mentee and stand alone authorities were totally satisfied with the toolkit.

6.3.6 Effectiveness of the mentoring scheme

Success of the mentoring scheme

All but one authority said that the mentoring process was a success. Firstly, the mentoring probed and teased out more information than the authorities thought they had. Thus, it gave them confidence and showed them that they had already achieved a lot and could go further. Additionally, the support that they received through mentoring gave them added impetus to achieve their goals. Bringing in senior management was frequently mentioned as a crucial part of the mentoring process, with all but one mentee authority bringing in their chief executive or director, and five out of the seven mentor authorities. However, it appears that none of the stand-alone authorities went this far. One mentor authority said that the mentoring process helped participants to understand how sustainable energy strategies relate to all aspects of the operations of an authority and how authorities have a leadership role in these areas. In addition, one mentee authority stated that it has achieved more in a short period than would have otherwise been the case and that the timing was perfect for them to give more impetus to their planned actions. One mentor authority found it useful to keep a beacon diary for their work with their mentored authority and they focused only on the five points that they had highlighted. Most of the authorities stated that they would like to stay in contact with other councils, especially beacons. One mentee authority supported that the toolkit has a wealth of material to refer to and associated documents but there are other sources with relevant information, while the real difference would be made via the continuation of interpersonal contact with a beacon council.

Nevertheless, two respondents were not satisfied with the mentoring process. Specifically, one mentor authority said it tried hard with significant inputs of time to install a sense of need and opportunity into its mentee, but this was not always shared. Also, in a couple of cases it was mentioned that problems of poor communication within the mentee authority made it hard for beacons to know who to communicate with within the authority**.** Finally, a mentor authority expressed the concern that they (mentors) used a strong hands-on approach when guiding the mentee authorities.

Stand-alone authorities and potential interaction with mentor authorities

The stand-alone authorities found the toolkit very useful but a couple mentioned they would have liked to have had at least one visit by a mentor authority during the scheme to complement the toolkit. Actually, some stand-alone authorities took advantage of the mentor authorities' knowledge and advice by contacting them informally. Also, three stand-alone authorities said that they were fine working without mentors as this taught them to find help internally and be more self-reliant. However, they would have liked to had contact with mentor authorities to find out in more depth of what worked well for the mentors and how to start taking action. Finally, one authority said that it was fine without interaction with a mentor authority but that it still didn't have time to implement anything from the toolkit.

6.3.7 Barriers to effectiveness

This section presents the barriers that local authorities faced in using effectively the mentoring scheme. Financial barriers and under-staffing were quoted as the major barriers in the application of the toolkit, as well as apathy, inertia and a difficulty in changing perceptions and behaviour within the authority. The latter was more an issue for stand-alone than mentee authorities. In addition, the toolkit was not ideally suited to authorities already making progress and formulating their own ideas; sometimes the experience of the mentor authorities was more valuable than the toolkit. A few authorities mentioned that having an officer dedicated to climate change would be of great use. Furthermore, nearly all authorities mentioned that the project was too short and in the 2- 6 months they had with their mentors they did not have enough time to work on all areas in enough detail. The optimal period would be at least six months.

Lack of time and resources often resulted in unpaid overtime. One mentor authority was able to boost the mentees capacity during a training day. Also, one mentor authority mentioned that key officers in the authority it mentored were often busy and it was hard to make appointments. This was overcome by being persistent and agreeing to set aside time for the benchmarking exercise. Some authorities would need to pay more to keep the level of expertise they received from mentors. Getting public buy-in was an important issue mentioned by a stand-alone authority, so they had the challenge to demonstrate that the actions in the toolkit were going to make a difference to the public. With respect to internal energy management, there are no incentives for managers to ensure their staff would try to conserve energy because energy costs do not come out of their budget, so others must take on the responsibility. For this reason,

individuals and energy champions were strategically chosen during the mentoring to work at changing staff behaviour. One authority said that the toolkit's comprehensive nature makes it daunting.

The authorities gave mixed responses regarding how they would overcome the barriers concerning the implementation of the toolkit, ranging from achieving Departmental and public buy-in, engaging Chief Executives, focusing on core issues and not trying to do everything at the same time, educating their staff, developing an energy champions group, and demonstrating that the policies have co-benefits.

6.3.8 Effect of mentoring on use of benchmarking matrix

The elements of the benchmarking matrix of the toolkit addressed by the authorities were mainly from Estate Manager and Service Provider parts of the benchmarking matrix. The most common elements were those of staff motivation and knowledge, political support, monitoring of energy use and carbon emissions, resources, fleet management, and systems of decision-making. Common measures included training of staff in the induction process, monitoring of energy consumption building by building, more financial resources allocated for sustainable energy development (planned for the next one to two years) and biodiesel adoption as a fuel of the fleet (planned for the next one to two years). Also, some authorities agreed to adopt emissions reduction targets for their Estate Management role in excess of national CO_2 reduction targets. A few went even further to agree to be carbon neutral. In addition, a few authorities agreed to install new metering technologies at all their sites for gas, water and electricity. Planned measures from authorities for the next one to two years that have a community-wide nature are:

- Active consultation and engagement with the community in developing a community-wide energy strategy. Link to wider work on education and behavioural change.
- Tackling climate change and fuel poverty through LAAs.
- Commitment by all public agencies in the LSP (Local Strategic Partnership) to consider means of reducing their energy consumption and purchase renewable energy if possible.
- Aspiration to have energy mentioned in all service plans.
- To use Local Development Framework (LDF) to set targets to generate 20% of energy from onsite renewable energy installations.

- LDF that encourages high energy efficiency standards (beyond Building Regulations) in new housing and other buildings.
- Identification of software to measure greenhouse gas emissions.
- Introduction of CO_2 reduction target into all new or refurbished properties.

Overall, the mentoring helped the less successful authorities to identify weak areas and raise the profile of energy in the local administration. The benefits of joining partnerships were highlighted as well as the need to work more on energy efficiency projects. The authorities will transfer to their staff the experience and knowledge that was gained from the mentoring scheme through: a. internal training, though not always exclusively stemming from the experience of the toolkit (for example a general one on sustainability was planned by one authority),; b. communication strategies of what has worked well; c. introduction of energy champions within Departments; d. events like free light-bulbs offer and films; e. publication of the energy strategies on intranet and internet; sending of email bulletins. However, the mentoring revealed that structural changes especially at the community leader role were not achieved. This is not surprising given the limited time that the mentoring lasted and the long time that is needed to change established approaches and policies. In some cases the mentoring had the least impact on the estate manager and service provider role of authorities, but these were also their strong area of action.

6.3.9 Recommendations from 'Outcome of Using the Toolkit'

The responses of the authorities on what changes in the document of the toolkit could contribute to the improvement of specific elements of the benchmarking matrix are presented in table 13. This part of the survey was completed by five authorities.

Table 13: Changes in the Toolkit Document that could Improve Elements Included in the Benchmarking Matrix

Addressed element	Response
Element 1.14 & 2.16 - 'staff motivation/knowledge'	Examples of what other authorities have done would be helpful.
Element 1.17 - 'resources'	Ways to encourage the council to re-invest savings and find resources for an energy team should be included in the toolkit.
Element 2.13 - 'service plans/strategies'	Examples of targets set on action plan within different services should be included in the toolkit.
Element 2.2.5.3 - 'waste management'	Examples of reducing energy used in waste would be helpful.
Element 1.12 – 'management systems/decision making'	The main barrier to this was cost and it had been put forward on several previous occasions. ISO 140001 was neglected for this reason. These are also non statutory so not seen important by the council.
Element 1.14 – 'staff motivation and knowledge'	The toolkit helped to increase commitment to these initiatives (increase the level of staff training on energy efficiency, organise an award scheme through energy champions at work).
Element 1.15 – 'monitoring of energy use and carbon emissions'	Toolkit needs to spell out more clearly the benefits as some people are still not convinced on the usefulness of installing new metering technology.
Element 1.25 – 'own buildings energy management'	The action involves displaying current energy use and certification in council buildings and the toolkit could include a better explanation of to the steps accreditation.
Element 2.1.3 – 'service plans/strategies'	More examples and case-studies would be helpful.

6.3.10 Legislation for on-site renewable energy production

The Planning and Energy Act 2008 offers local authorities the power to *reasonably* require that new developments in their areas cover part of their on-site needs by renewable energy sources (Office of Public Sector Information 2008b). Merton Borough Council was the first council in the UK that voluntarily adopted such a provision, named as the Merton Rule, in its Unitary Development Plan in 2004 (The Merton Rule 2008a). Most similar provisions by other local authorities that followed had a target of 10% from renewable energy sources while some of them exceeded this percentage. Thus the provision is frequently referred to as the 10%+ renewable energy target. When authorities were asked about their approach to the 10%+ of on-site renewable energy production at new and refurbished buildings in their local authority area they gave the

following responses that are summarised according to the type of the authority (mentor, mentee, stand-alone). The term 'target' means that an authority has not made this provision a formal policy yet. Where the authority has already adopted this legislation, it is stated so. Each point refers to a single local authority:

Mentor Authorities

- 15% of renewable energy now but 20% in 4 years' time
- 12% of renewable energy now and increasing 1% per year
- Target of 20% renewable energy in its draft planning policy
- Discussing 10% of renewable energy in the Core Strategy of planning policy
- No formal target but Local Development Framework that is due to be adopted in December 2010 will have planning provisions that ensure reduced greenhouse gas emissions from new developments
- No formal target
- No formal target

Mentee Authorities

- At least 20% of renewable energy is discussed in the Planning Policy for the next 15 years
- At least 10% of renewable energy in three Districts of the County and mention of on-site renewable production in Planning Policy of other two Districts of the County but without formal target yet
- 10% of renewable energy proposed in the Planning Guidance for the District Councils of the County
- At least 10% reduction from predicted CO_2 emissions contained in the Local Development Framework
- Unfixed as yet- would like to set 20%
- No, work on reducing energy instead
- No formal target – Just mention in the Core Planning Strategy of the need to exploit renewable energies

Stand-Alone Authorities

- At least 10% reduction from predicted CO_2 emissions to be adopted by the end of 2008 through on site renewable energies
- 12% target of renewable energy, rising by 1% each year
- 10% target of renewable energy

- At least 10% of renewable energy is included in the Supplementary Planning Guidance of Affordable Housing that will be adopted as an interim guidance and formally adopted as part of the Core Strategy that is expected to be approved in May 2011
- No target - instead 2% energy reduction year on year at own estate
- No target

Updates on the answers of the authorities were checked on their web sites by looking at planning, energy, environmental and climate change reports on the 28th October 2008 to identify whether they have changed since they were given in May 2007. Where appropriate the amendment has been included but this was only in very few cases. However, the Planning and Energy Act that gives the legislative power to local authorities to adopt the 10%+ targets had not been proposed when the authorities gave their answers in the survey. It is likely that the new Act will make authorities more receptive to adopt on-site renewable energy targets.

6.3.11 Measuring the progress of climate change and energy policies

Local authorities were asked to specify at which scale (estate management or wider community or both) they monitor greenhouse gas emissions. The frequency of responses sorted by type of local authority with some explanatory comments are summarised in table 14.

Table 14: Scale at which Local Authorities Monitor Greenhouse Gas Emissions

Type of local authority	Estate	Estate and Community
Beacon Councils	Four active but one of them has not incorporated transport yet.	Three active.
Mentee Authorities	Six active and one to start soon.	One of the active in Estate wants to expand to community-wide.
Stand-Alone Authorities	Three active and two to start soon.	One active and one wants to expand to community-wide.

Nearly half Beacon Councils are engaged in monitoring greenhouse gas emissions at community level. On the other hand, one stand-alone authority monitors emissions at community level but none of the mentees does. One stand-alone and one mentee stated that they want to start doing so at community level. Internal emissions were estimated from various sources such as electricity through smart metering or manual measurements, waste based on relevant load and transportation through fleet mileage. Most of the authorities acknowledged the importance of the metric of carbon dioxide as

a means to measure progress on climate policy, and some of them would appreciate guidance on which software or quantification tool should use to calculate emissions.

With respect to alternative methods that are used or planned be used in the near future to measure progress on climate change, one mentor authority uses the financial savings from sustainable energy projects and another the number of energy efficiency/low carbon measures implemented. One mentor would use the benchmarking matrix as an action plan and monitor performance against it and another said that its work on sustainable energy now fits under the broad umbrella of its carbon management plan which was recently approved by Councillors. This plan includes a programme of work, and a series of aims and targets which allow the authority to measure the progress of implementation. One mentee authority mentioned the use of the On Target diagram and another authority the amount of finance given to external expertise to get help would be other methods of measuring. One authority stated that it would adopt an action plan taking ten key actions as an Appendix to the climate change strategy and the outcomes would be reviewed by the steering group and reported to asset management and the cabinet. Another authority said that it would adopt an action plan and benchmark and monitor performance against it. Local Best Value Performance Indicators would be used by a different authority as well as its work in sustainable development that will be undertaken by the Sustainable Development Task Group and the Sustainable Transport Task Group. A stand-alone authority intends to assess progress through whether most agreed actions will be implemented.

In October 2008, all mentee and stand-alone authorities were contacted by email to give some brief information on whether they had set the processes and implemented actions so far that were agreed in the mentoring scheme. The inquiry asked for a list of the most important actions (particularly in the Community Leader role) that had been carried out and those that hadn't with a comment on which had been the main barriers for inaction. The researcher informed the authorities that this inquiry was independent of the analysis undertaken for the mentoring scheme. Reminders were sent to authorities but unfortunately no reply was received as discussed previously. Also, the researcher made contact in October 2008 with those authorities that already monitor emissions at community level and posed to them the following questions:

- For which years have emissions been estimated?
- What energy data does your authority use to estimate community emissions and which greenhouse gases and sectors are included?

- Which quantification tool/software does your authority use to produce emissions estimates?
- Why, if any, your authority does not make use of Defra's local CO_2 estimates?
- How the estimates have been used, if any, to push action in climate change mitigation at community level?
- Have the estimates been presented to Chief Executives, Heads of Departments and Councillors?
- Will your authority continue to estimate emissions by itself, although local CO_2 estimates with National Statistics Status are produced by Defra?

Replies were received from Leicester City Council (Webber 2008) and Woking Borough Council (Curran 2008). The responses are gathered in table 15 that follows.

Table 15: Information on the Monitoring and Use of Community Greenhouse Gas Emissions from Authorities of the Survey

Content of question	Leicester City Council	Woking Borough Council (BC)
Years covered	1990 and 2004	Since 1990. For 1990, UK CO_2 emissions estimates were scaled by population to gain an estimate for Woking BC. The Council used known savings from Council energy projects and energy efficiency improvements in homes to estimate emission savings for the years after the 1990 baseline.
Energy data	For 1990 estimates, outputs of DREAM model for 1990 – Road transport for 1990 estimated from 2004 data assuming 12% national increase from 1990 to 2004. For 2004 estimates, DTI local data of electricity and gas for 2004 and other fuels for 2003. Emissions factors based on those used with the ICLEI's Councils for Climate Protection software.	Estimates were derived pro rata from national emissions.
Sectors	Residential, industrial/commercial, and transport	Residential, industrial/commercial, and transport
Quantification tool	ICLEI's Councils for Climate Protection software.	In the reply, it was not specified how the emission savings were estimated.
Use of Defra's estimates	The 2004 estimates from De Montfort University and Leicester Energy Agency are reasonably similar to the Defra CO_2 estimates for 2004 (DMU/LEA: 1983Kt of CO_2 eq., Defra: 2160 KtCO_2 eq.)	Defra's estimates for 2003 were used as a baseline and subsequent Defra's estimates are used for comparison with the baseline. The revised National Statistics Defra's figures for 2005 will be used as a new baseline both for community CO_2 emissions and for the NI-186.
Use of estimates to push action	Estimates included in the Leicester Climate Change Strategy 2003. The CO_2 estimates are included in Leicester City Council's Environmental Statement (April 2006-March 2007). Leicester's target of reducing city-wide CO_2 emissions to 50% of 1990 levels by 2025/26 has been included in the Council's Environmental Management System Programme 2006/07. In Leicester's Local Area Agreement, the NI 186 has been adopted.	Woking BC has used the 21% reduction of CO_2 community-wide emissions of 2005 from 1990 levels in its Beacon application for the theme of 'Tackling Climate Change' as a supporting evidence of its climate change mitigation effort.
Presentation to CE, Heads and Councillors	CO2 estimates for Leicester City Council and for Leicester have been used with a Committee report related to climate change	All actions and savings linked to the Climate Change Strategy are presented to the Climate Change Working Group which is group attended by the Chief Executive and nominated Councillors. Monitoring is also presented in the Council's Service Plans and Annual Sustainability Report.
Future estimates	Leicester will be able to use Defra's figures, perhaps making any additional estimates itself as needed.	Woking BC will be using the emissions monitoring spreadsheets and methodology as per Defra requirements. With the introduction of the Government's new National Indicators on Climate Change, Woking BC is currently looking at aligning its monitoring with the requirements of these indicators.

The replies from Leicester City Council and Woking Borough Council show that Leicester has worked with the local research community to produce community-wide emission estimates that are close to Defra's figures while Woking relied exclusively on Defra's figures. Both local authorities used in the past (due to lack of real input data) methods (for example pro-rata scaling) that produced uncertainties in the estimates. Both authorities have used community figures in various reports and committees to inform leaders and chief executives. Thus, these authorities that are forward looking in the management of greenhouse gas emissions (both are Beacon Councils for Sustainable Energy and Woking is also Beacon Council for Climate Change) have understood the need to communicate facts and figures to the upper level of the council hierarchy. Both Councils will use Defra's emission figures in the future but Leicester is considering making amendments by themselves to Defra's figures. This approach initially seems valid for using the results internally but seems to raise consistency issues with respect to figures from other authorities that will not use Leicester's amending approach. Defra does not advise local authorities even to compare community figures between each other, although the latest figures have received National Statistics Status. However, it is unknown how figures will be used in practice and whether a kind of comparison across authorities will be conducted and made available to the public domain. The next section summarises the key findings from the case-study.

6.4 Conclusions

The findings of the case-study analysis suggest that:

- Both District Authorities and Unitary Authorities/London Borough/County Councils scored well in the provision of services. However, there is a difficulty in putting into practice policies and programmes at community level. When comparing across the three roles of Estate Manager, Service Provider and Community Leader, a better score in Processes is normally not associated with a corresponding degree of performance in the Delivery of Policies, with the latter being almost always lower. When scores are combined from mentee and stand-alone authorities in the Delivery of Services/Policies, the provision of services (Service Provider role) scores between Fair and Good. The Delivery of Policies in the Estate Manager and Community Leader roles, follow in a descending order scoring between Basic and Fair. These findings are derived from a very small sample thus they are not statistically reliable.

- Some mentor authorities (beacons) measure their community CO_2 emissions against reduction targets. A few participating authorities would like more guidance as to which software to use for monitoring greenhouse gas emissions. Some semi-qualitative factors are already used by mentors for measuring progress like the number of projects implemented and financial savings from project implementation. A few authorities said they would use a benchmarking matrix to measure progress in the future.

- There was a mixed view by the authorities regarding the usefulness of the toolkit. Some parts of the toolkit were perceived as a very useful resource while others as moderately or not very useful at all. Various authorities (especially the stand-alone) stated that they would have liked to have got more detailed information on the early experiences of the mentors and the barriers they faced on sustainable energy.

- Nearly all authorities found the mentoring process a success but would have liked more time available; at least six months instead of the three months that were spent. Most stand-alone authorities thought that it had been a success but they would have appreciated occasional contact with a mentor.

- Eight authorities were made more aware of the significance of forming local partnerships. Some attempted to set up more partnerships or strengthen the existing ones, but due to the short timescale of this project it was hard to gain any advantage during the mentoring.

- The participating authorities have implemented many actions or plan to in the next two years as a result of the mentoring scheme in the areas of staff motivation and knowledge, travel plans, energy and carbon emissions monitoring, and political support. Some of the planned actions were related to the wider role of the authorities as community leaders. The authorities plan to overcome barriers on the implementation of the toolkit by all-Departmental engagement on energy and by achieving buy-in from Chief Executives and the public.

Chapter 7 that follows contains overall conclusions and policy recommendations from this thesis on key strategic and policy issues that can assist UK local authorities set in motion the relevant processes and implement sustainable energy and climate policies.

7. Overall Conclusions and Policy Recommendations

7.1 Introduction

This thesis has looked at how UK local authorities could reliably measure progress on climate change mitigation, and what strategic and policy topics need to be addressed to assist them in improving their performance. The availability and accuracy of energy data at the local level has been reviewed and a survey of local authorities was undertaken. Conclusions are presented in four parts:

- the energy policy context
- the approach to measuring progress
- the findings of the case-study
- policy recommendations

7.2 Energy policy context

Whilst climate change is high on the political agenda in the UK, the approach by the majority of local authorities is not yet comprehensive as most of them concentrate their efforts on their own operations. The role of the authorities as community leaders in emissions reductions is much more complicated and difficult to realise since it involves other parts of society such as citizens and business. However, there are examples of excellence of action being taken at community level.

The case-study of this thesis suggests that the main barriers faced by local authorities in implementing measures are lack of time and resources, with a lack of interest and motivation from other staff or senior management hindering effectiveness (6.3.7). This lack of senior management buy-in is an indication of a 'leadership deficit' in less successful authorities. The mentoring scheme of the case-study tried to fill this gap by bringing in senior management activities and this was much stronger in the mentored authorities compared to stand-alone ones. Some barriers of this case-study are similar to those identified in previous surveys carried out in 2002 and 2004.

The energy policy regime that relates to local action in the UK is complex, fast changing and has a plethora of powers and guidance available to local authorities (3.5, 3.6, Appendix 1). This reduces the clarity as to which mechanisms are the most appropriate to be adopted for emissions reductions. Legislation introduced during the last few years has helped towards action and local authorities can make use of it to

promote sustainable energy. The climate change indicators of the Local Government Performance Framework are now featuring highly in Local Area Agreements and this is a sign that the significance of climate policy is increasing. Nevertheless, there is a need for progressive action from local authorities that will spread at the community level in the medium to the long-term. Such an approach, which is challenging given the conflicting interests of stakeholders involved in local politics and the limited available resources, would be compatible with the serious intention of the Government to reduce emissions evident in the UK Climate Change Act 2008. This Act introduced a legally UK binding target of at least as 80% reduction of greenhouse gas emissions from baseline levels by 2050. Thus, local authorities could help towards achievement of national emission targets, as well as international emissions reduction obligations of the UK.

However, it is very difficult to assess what could practically be the *maximum* contribution towards these targets from policies of local authorities as the influence of these policies on the behaviour of final energy consumers is debatable and difficult to assess and apportion. This is because many other factors which are out of the remit of local government influence local emissions. The imposition of a direct statutory duty on authorities to reduce emissions is discussed by the LGA, but this would raise issues of burden sharing, over or under compliance and legal disputes. The next section describes the findings on topics related to measuring the progress of local authorities.

7.3 Assessment of the progress of UK local authorities

At the start of this project it was assumed that the local energy statistics for gas, electricity and transport issued by the Government could be used to reliably assess the progress of UK local authorities on climate change mitigation. However, the data produced up to December 2007 were classified as experimental; therefore they could not be used for year on year comparisons. Methodological changes throughout the years increased the accuracy of the spatial distribution of the data especially for gas and electricity. Road transport data are modelled thus the uncertainty of these data is higher compared to gas and electricity. The local gas, electricity and road transport consumption data for 2005, 2006 & 2007 were classified as National Statistics in 2008 and 2009 which means that they are accurate, comprehensive and meaningful. Data analysis based on these energy statistics for 2005, 2006 and 2007 in this thesis shows that most beacons and stand-alone authorities have reduced carbon dioxide emissions

consecutively with the rate of emissions reduction being declined. For mentee authorities there are not clear trends identified. Reliable explanation on causes of emission changes requires more longitudinal data and in-depth policy analysis. Nonetheless, the data still cannot be used to assess the effectiveness of local climate policies due to only two years of reliable data being available. Once more longitudinal data are available, in-depth quantitative and policy analysis could identify trends in emissions and partly explain the reasons for emissions changes.

This research started before the introduction of the climate change indicators of the Local Government Performance Framework and was originally focused partly on measuring the progress of UK local authorities quantitatively. As a result of the requirement to report the climate change indicators and the National Statistics Status of the postcode energy data, local authorities now have at their disposal the metric of carbon dioxide to reliably monitor changes in their community emissions from year to year, a feature that could not be explored during this project. Due to different circumstances in each authority, comparison of estimates is not advised across authorities even though data are endorsed by National Statistics. Instead, authorities are advised to monitor emissions and from year to year internally and for their own community. In the future, local authorities would partly, due to many factors out of the influence of local authorities affecting local emissions, assess the effectiveness of their climate change policies at the community level by using such longitudinal data to identify trends in emissions. Comparison of post code estimates with emission targets will give signals as to whether authorities should alter their strategy.

Long-term reliable emissions estimates can be used to legitimise further action at the local level because they can partly reveal the success of policies, thus building consensus and trust across stakeholders. Nevertheless, the extent to which they can contribute to effective policy responses is still unknown. This is because firstly there is no historical equivalent at the local level in this policy field, and secondly due to the large uncertainly in the politics of climate change at the local level. The next section summarises conclusions from the case-study.

7.4 Case-study of a sample of UK local authorities

The case-study of a sample of twenty local authorities identified the baseline position of twelve less successful authorities and explored key strategic and policy issues that can assist them to improve their performance on energy and climate policy. The less successful authorities (mentee and stand-alone) were self-benchmarked in three broad roles; the Estate Manager; the Service Provider; the Community Leader. The benchmarking matrix contains two wide functions for each role: the *processes* and the *delivery of services/policies*. The authorities were categorised according to their administrative type (District Authorities or Unitary Authorities/London Boroughs/County Councils). The benchmarking analysis used a combination of these roles, functions and administrative types to produce results (see figures 5 - 9 in sections 6.2.2 to 6.2.6). The findings that follow refer to: either mentee authorities; either stand-alone authorities; combined from mentee and stand-alone authorities. In all of the types of analysis, no benchmark result scored between Good and Excellent. The findings also show that most of the authorities have concentrated on the service provision which is the area where they have the higher scores. The delivery of policies as Community Leaders proved very challenging. This was the area of the lowest score when results from mentee and stand-alone authorities (combined), split by role and benchmarking function, were compared. In some cases, the scores for the delivery of policies under the community role were lower compared to the corresponding score (on delivery) of the other two roles, despite the fact that the community leader role had scored higher in the processes in comparison to the other roles. This reveals even more the difficulty for local authorities in implementing policies at community level. When both Processes, and Delivery of Services/Policies are considered from mentee and stand-alone authorities (combined), the highest score is for the Service Provider role at 2,23 (between Fair and Good). It is then followed by the Estate Manager and Community Leader scores that range between Basic and Fair in descending order. The analysis suggests that in many cases the score for the processes is higher than the corresponding one for the delivery of services/policies. This implies that authorities should place increasing emphasis on delivering services and policies.

Regarding the measurement of progress by tracking local carbon dioxide emissions, few local authorities monitor such data. Instead local authorities use semi-qualitative factors, like the number of delivered projects and the financial savings from implementing measures, to assess the progress of climate policies (6.3.11). Two

mentor authorities use local CO_2 statistics in official reports, statements and programmes and publicise them to top managers and Councillors in order to enhance effective responses in emissions reductions (6.3.11; Table 15). Some local authorities would like more guidance as to which tools to use for monitoring greenhouse gas emissions (6.3.11). Most authorities said they measure estate emissions while very few were willing to monitor emissions at community level, although they noted the importance of the metric of carbon dioxide in measuring progress (6.3.11). However, the relevant question was posed to the authorities before the requirement of the Local Government Performance Framework on authorities to report community per-capita CO_2 emissions was officially adopted. Regarding the 10%+ legislation of on-site renewable energy production target, it has been adopted by some local authorities of the case-study (6.3.10). This is an example of a local initiative that requires further evaluation.

The findings of the survey revealed that the authorities raised the profile of energy and climate policy within their administration (6.3.5, 6.3.6) and took initiatives as a result of the mentoring scheme (6.3.8). Not all authorities found the toolkit helpful in substantially upgrading the development and implementation of policies but it highlighted weak areas in need of improvement (6.3.8). The face-to-face contact with the Beacon Councils (mentors) and the engagement with Chief Executives were quoted by authorities as key reasons for successfully participating in the pilot scheme (6.3.6). Indeed, the stand-alone authorities stated that they would like having contact with a mentor authority during the scheme (6.3.6). Nearly all authorities asserted they are in favour of networking with other authorities on energy and climate policy in the near future (6.3.6).

In addition, the case-study revealed the complexity and challenge of the task to develop and implement ambitious local climate change strategies (low score for Community Leader role on benchmarking results, see 6.2; adopted initiatives due to mentoring focused mainly on estate management, see 6.3.8) as well as the existence of specific circumstances that apply to each authority in greenhouse gas management. This is seen from the fact that authorities took and agreed on diverse responses on sustainable energy as a result of the case-study (6.3.8). These factors dictate the need to set fair and achievable emissions targets based on the capacity of an authority to act. It is difficult to recommend a specific annual target for emissions reductions

because this requires a case-study approach tailored to each authority. However, targets should be subject to full and open consultations with all relevant stakeholders including groups of local citizens to build trust and consensus. The targets should be flexible and aim to achieve reduction goals in specific time periods in alignment with the UK Climate Change Act 2008.

The policy recommendations for local authorities that are presented in the next section provide broad principles and strategic recommendations on local energy and climate policy. Specific and tailored recommendations for individual local authorities require more in-depth case-studies. The policy recommendations aim to assist local authorities to improve their performance, by setting in motion relevant processes and implementing policies on energy and climate policy.

7.5 Policy recommendations for UK local authorities on sustainable energy and climate policy

7.5.1 Leadership

Gaining support from elected members and senior managers is crucial for the success of a climate change policy (6.3.6). Thus, there is a need for each local authority to work internally more on the leadership issue and develop or increase corporate support. All-party support would be essential to build consensus and trust on climate change mitigation.

7.5.2 The issues of key staff and an integrated approach

Local authorities have a particular difficulty in setting up the processes, developing and implementing strategies in the Community Leader role (6.2). This is the result partly of an inadequate institutional capacity within their administrations to address climate change (6.3.7). This thesis recommends that a critical mass of key staff be developed and embedded in the institutional structure of each local authority to address the challenges of managing greenhouse gas emissions with special emphasis on engaging with the community in the medium to long-term. Continuous training and information awareness could help on this direction. Some authorities of the case-study introduced such endeavours as a result of participating in the mentoring scheme (6.3.8). Local authorities that are commencing their efforts to manage emissions (this being the bulk of UK authorities) should focus firstly on their own emissions sources. This type of action involves less resources and risk compared to community action. Tackling the

internal emissions is preferable for local authorities without significant experience on sustainable energy and climate policies as regards emissions at community level. The need for tailored emission targets for each authority mentioned in section 7.4, and the stakeholder nature of developing and implementing climate policies at the local level involves negotiation and compromise between the authorities and relevant bodies. It is recommended by this thesis that the Improvement and Development Agency provides help in this skill by organizing seminars where professionals will give insight and discuss useful techniques.

There is a need to apply an interdisciplinary and interdepartmental approach (6.3.5). The energy policy of local authorities should prioritise action on sustainable energy, since there are so many options on energy with varying environmental, social, economic and political impacts that can be followed. Local authorities should conduct interdisciplinary research assisted by independent experts. The methods of *multi-criteria decision analysis*, and *system analysis* could be used in such an approach. The *system analysis* in municipal policy and politics explores how the relationships between different components of the municipality work when it is viewed as a system, how they change and what are their impacts on the system. Components of the municipal system' could be the institutional rules, human resource, know-how etc. (Lerch 2007). The multi-criteria decision analysis is a methodological research tool which allows the modelling of the behaviours of a system, and then tests them to understand the system better. This method of research derives practical lessons from an otherwise abstract picture of the system (Lerch 2007).

There is also a need to recognise that climate change affects all policy areas, and integrates action from all Departments. Local authorities should strengthen interaction with public, private and civic actors in their community to identify opportunities for joint action. Some authorities of the case-study put high priority on working in partnerships and such policy through LAAs and LSP has been planned for the near future as a result of the mentoring scheme (6.3.8). Finally, more projects on sharing of energy and climate change expertise between UK local authorities should be initiated as the authorities of the case-study took steps to develop and implement policies and measures on sustainable energy and climate policy as a result of participating in the pilot scheme.

7.5.3 Estimating greenhouse gas emissions

Some participating authorities said that they needed guidance on which software to use to model or calculate greenhouse gas emissions (6.3.11). This response was given in April 2006, which is before the introduction of the requirement for authorities to report their own emissions and per-capita emissions from their community. Defra advises authorities to use a methodology developed by the Carbon Trust to calculate their own emissions, including a specific spreadsheet tool for quantifying emissions. Thus, this research recommends that the Carbon Trust in combination with Universities, Professional Bodies, the Local Government Association and the Improvement & Development Agency should train UK local authorities on how to use this methodology to estimate their own emissions.

Defra produces per-capita community estimates on behalf of local authorities, and figures for 2005 and 2006 were published in September 2008. This data is one of the two climate change indicators introduced by the Local Government Performance Framework 2006. One of the mentor authorities of the case-study, Leicester City Council, stated that it will use Defra's emissions estimates in the future but amending them where possible by using additional data and techniques (6.3.11). Authorities are not advised by Defra to compare estimates between each other due to different local circumstances, and the adoption of different methodologies in producing emissions will bring confusion concerning which technique is the most appropriate, and question the validity of the results. Thus, this thesis recommends that Defra continues estimating per-capita CO_2 emissions at community level on behalf of authorities. Such a provision would ensure consistency in the methodology and format of the results, as well as filling a potential gap in the capacity of authorities to undertake such a task. Authorities that wish to produce estimates by using diversified methods should use these figures within their local government and community, but in official reports and documents at county, regional and national level should provide Defra's estimates.

7.5.4 Assessment of progress

Local authorities should assess their position regarding sustainable energy at regular intervals, for instance annually. Such an endeavour would help assess elements and domains in need of improvement and the extent of required action.

7.6 Recommendations for further research

This section discusses policy topics arising from this thesis that could be of interest for future research. Cities, municipalities and rural areas are major sources of greenhouse gas emissions worldwide. This thesis showed that knowledge transfer to less successful local authorities can initiate processes for their improved policy responses on sustainable energy (Chapter 6: case-study). Local government has a significant role on managing local emissions. Thus, the design and accomplishment of in-depth comparative studies across local areas of diverse capacity to act, with a focus on the role of the local government, can produce useful policy findings, based on extended data collection and in-depth analysis. Policy recommendations produced from such a study could spill-over to other localities as well, thus reducing the need to re-invent the wheel. Although, the transfer of knowledge should be done with caution as each authority has its own circumstances, the findings can be a source of principles and ideas to other authorities.

Additionally, there are diverse policy aspects and actors relevant to climate policy at the local level that work in an interrelated and dynamic way. Their integration and study in a common framework would be very promising as there is a need for an integrated and interdisciplinary approach to local greenhouse gas management. The Swedish experience reveals that some municipalities have adopted such an approach for sustainable development via their Natural Step framework, and *system analysis* is a growing area of research in Peak Oil and Climate Change Policy at a city-wide scale according to the Post Carbon Institute in the US (Lerch 2007). Thus, it would be valuable if research was conducted on the production of frameworks for managing local greenhouse gas emissions that incorporate various factors (stakeholders, initiatives, policies etc.) acting in an interrelated way often at different geographical scales. Such research could provide a guidance framework where uncertainties are addressed and effectiveness of policy responses increases.

In relation to the previous point on system analysis, this thesis revealed that local climate policy is influenced by various institutions and bodies that act at national level in the UK (3.8, Appendix 1). Taking this fact a step further, it would be useful to explore various aspects of the multi-level governance of local climate policies. For example, there is evidence that energy liberalisation in the EU restricts local government to act on sustainable energy in some areas (Kern and Monstadt 2008): the liberalisation of

energy markets in Germany has reduced the power of municipalities on energy policy, for example by limiting their right to own power plants. On the other hand, the integration of markets and politics at EU level has created opportunities; for instance there are EU local authorities that have energy offices in Brussels and are involved directly with the EU. These local authorities, by-pass the national state and exercise a Para-Diplomacy as it is referred to by Kern and Monstadt (2008). How this highly integrated and at the same time fragmented policy regime influences local authorities on sustainable energy would be a valuable theme to explore.

The role of elected members and senior officers of local authorities is highly important in determining the success of local climate policies (6.3.6). As a result, it would be useful to explore how the organisational culture and professional norms in Local Government and other Public Policy Institutions affect their decision making on local energy politics.

Finally, increased collaboration between researchers and local government on energy policy would be valuable. Researchers can provide independent policy recommendations to local practitioners and are perceived as trustworthy, especially within the same geographical area. As the background of professionals in these two domains are different, it would be valuable to explore lessons from such collaboration; specifically how to motivate both kinds of specialists to work together and what tools can be used to make this interaction more effective by helping each type of professional to better understand the needs and norms of the other.

7.7 Publications

The work on this thesis led to the publication:

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9. Appendices

Appendix 1: Tools for Delivery of Sustainable Energy at the Local Level in the UK

Appendix 2: Local Energy Consumption Statistics in the UK

Appendix 3: Provision of Expertise to Local Authorities through Energy Networks: The International Experience

Appendix 4: Template of Postal and Telephone Interview Questionnaires

Appendix 1: Tools for Delivery of Sustainable Energy at the Local Level in the UK

This Appendix presents a list of tools that can assist local authorities manage greenhouse gas emissions.

Local Area Agreements

The primary objective of a LAA is to deliver sustainable communities for the betterment of local people. It is a three year 'contract' between the Central and the Local Government and in return the Local Government receives support from the Central Government. It is entirely up to local partners to decide what would be most appropriate for their area (IDeA 2008). The Local Government White Paper states where appropriate climate change targets should be included in LAAs (Communities and Local Government 2006a).

The Nottingham Declaration on climate change

A plethora of guidance and exchange of good experience and expertise is established with the Nottingham Declaration on Climate Change. For example, the Action Pack explains how the local authority can reduce greenhouse gas emissions and adapt to the climate changes that are already underway. An Action Plan of 5 stages has been devised to help local authorities in mitigation and adaptation (Energy Saving Trust 2008a). As of 9th May 2008, 334 local authorities had signed the Nottingham Declaration (LGA 2008c). In other cases the Nottingham Declaration could not be the whole but part of a climate change plan. For example, in Southampton City Council a local climate change strategy was developed in 2005. Signing the Declaration was the first step of the approach to create commitment for action against climate change (IDeA 2005b). Seventy percent of local authorities are developing a climate change action plan as a commitment from the signing of the Nottingham Declaration. Although the Nottingham Declaration is a welcome initiative, it only shows a degree of *willingness* by local authorities to reduce emissions but not a level of *commitment*. Commitment will be revealed only if the Nottingham Declaration is translated into action that brings emissions reductions.

Energy Efficiency Commitment

Under the Energy Efficiency Commitment scheme (EEC), electricity and gas suppliers are obliged to deliver energy efficiency measures to domestic households in Great Britain. This scheme also helps to eradicate fuel poverty since at least 50% of the

energy savings must be achieved in priority households of certain social benefits. The second phase of the EEC ran until March 2008 (it started in April 2005) and has been replaced by the third phase renamed as the Carbon Emissions Reduction Target (CERT). CERT runs from April 2008 to March 2011 and is expected to achieve 154 million tonnes of CO_2 lifetime emissions savings, which would be around twice the savings of the previous phase. Suppliers should direct at least 40% of the emissions savings to priority groups (Defra 2007c). The scheme will include not only energy efficiency measures but also micro-generation installations for electricity and heat production, biomass community heating, CHP (Defra 2007c)**,** and energy reduction measures which change the behaviour of consumer (Footitt, Wood and Turnpenny 2007). The scheme is related to Social Housing Providers including local authorities (Footitt, Wood and Turnpenny 2007). However, many householders do not have much faith that utilities are willing to subsidize EEC projects because they (utilities) are perceived as just aiming to make profits by selling electricity and gas. On the contrary, surveys suggest that written statements from local authorities are perceived as more trustworthy. Therefore, joint promotion between authorities and utilities has proved very successful. Some authorities have been engaged in provision of council tax rebates to householders in EEC schemes (Footitt 2007).

Warm Zones

Warm Zones is a large scale area based programme that aims to bring significant benefits to all households in a defined zone in energy efficiency, fuel poverty reduction and carbon savings, including the vulnerable households. The programme is independently evaluated by Defra, dBERR**,** and Energy Saving Trust. Warm Zones is part of the National Energy Action which is the national fuel poverty charity. The scheme is managed and coordinated by Warm Zones Limited (WZL) which is a non profit subsidiary of National Action Energy. WZL promotes the scheme to local authorities, energy suppliers and other partners. WZL brokers funds and grants from various sources to deliver the benefits (Warm Zones Ltd 2007a). In London, the established Warm Zone offers up to 75% discount for loft and cavity wall insulation for homeowners of any income. The prices of the energy efficiency measures are subsidised by EDF Energy (Londonwarmzones 2007). Warm Zones are also active in identifying and referring households to other schemes like the Warm Front scheme (Warm Zones Ltd 2007b).

A similar approach to Warm Zones could be developed in the so called low carbon zones that are proposed in the Homes Truths report published on 27th of November 2007 by Brenda Boardman of the Environmental Change Institute of the University of Oxford on how an 80% reduction in CO_2 emissions from homes in the UK could be achieved. The low carbon zones would be created in areas with a high concentration of fuel poor households and local authorities would implement street by street energy efficiency improvements such as upgrading windows, walls and roofs in each home in the zone. The report also supports that current Governmental policies can achieve at best a reduction in CO_2 emissions from housing ranging from 11% to 18% by 2020 which is around half the 30% reduction required to be on course to reduce CO_2 emissions by 60% by 2050 (Aldred 2007a)

Warm Front

Warm Front is the largest scheme of the Central Government to tackle fuel poverty. It operates in England (similar schemes are available in Scotland, Northern Ireland and Wales) and targets private owner occupied and rented sectors (Warm Front Team 2007a). The insulation and/or heating measures offered can have a maximum value of £2,700 increasing to £4,000 if the central heating fuel is oil. The scheme is exclusive to vulnerable households like the elderly, families with young children, disabled and long-term sick people (Warm Front Team 2007b). Warm Front Grants are only used to make homes of vulnerable people comply with the Decent Homes Standard. Some local authorities are collaborating with Warm Front to determine whether homes have been made decent (Housing Intelligence for the East Midlands 2007).

Decent Home Standards

The Government has challenged local authorities and housing associations to meet the Decent Homes Standards that guarantee that a household is warm, weatherproof and has reasonably modern facilities (Communities and Local Government 2007c). The thermal comfort criterion of the Decent Homes Standards dictates dwellings have effective insulation and efficient heating (Communities and Local Government 2007d). The number of social housing buildings that do not comply with basic decent home standards such as warmth and waterproof protection has fallen from two million to one million over the last decade. Local authorities are well on track to make 95% of all social housing buildings meeting the decent home standards by 2010. Social housing are more environmentally friendly compared to private houses. They are also more

likely to have proper insulation as figures show that just 27% of private homes have proper loft insulation compared to 44% of social housing buildings (Branigan 2007).

Code for Sustainable Homes

The Code for Sustainable Homes was introduced in April 2007 for new homes and provides a methodology for assessing the overall sustainability of homes. The Code sets sustainability standards that are applicable to all homes and plays the role of a national standard that aims to guide industry in the design and construction of sustainable homes. The Code sets six levels each one with minimum energy efficiency/carbon emissions and water efficiency standards. Standards of level 1 are higher compared to the minimum mandatory standards of the Buildings Regulations. Initially, the Code was voluntary and a development is not required to meet the high standards of the Code unless it is financed with public funding. Thus, Local Government would have to comply with the Code when it spends finance on new developments (Communities and Local Government 2006b). Since 1 May 2008, a mandatory rating against the Code is required. This was confirmed by the Government on 27th February 2008 (Communities and Local Government 2008). The LGA Climate Change Commission taking as example the Code for Sustainable Homes proposes that the CLG should be responsible for the development of a Code for Existing Homes as part of a holistic energy housing strategy (LGA Climate Change Commission 2007a).

The Energy Saving Trust initiatives

The Energy Saving Trust provides a range of programmes to support local authorities in their energy policies. The Practical Help is the main programme of support of the EST for local authorities. This is a UK wide programme for local authorities and aims to support the implementation of strategies for increasing energy efficiency and renewable energy. Up to recently, Practical Help was focused on operational aspects of energy policies but it has now expanded its scope and includes senior managers and politicians. Thus, it covers both strategic and operational levels. While only little training and few workshops have been delivered to date, almost all have been very successful and resulted in tangible actions, for example planning the development of a comprehensive climate change policy (Wade et al. 2007).

The Carbon Trust tools

The Local Authority Carbon Management Programme (LACM) of the Carbon Trust provides local authorities with technical and management support for emissions reductions. The programme is focused on emissions reductions from activities related to the local authority's buildings, vehicle fleets, street lighting and landfill sites. The programme offers consultancy through workshops and limited dedicated support. It was launched in 2003 and 98 local authorities have participated since then (Carbon Trust 2007b). The *Salix* programme of the Carbon Trust offers financial support to local authorities. *Salix* is an independent company set up by the Carbon Trust in 2004 to work with the public sector for emissions reductions through investment in energy efficiency. *Salix* is particularly looking for committed leaders who can give their managers support and resources throughout the project. *Salix* will normally provide a kick start grant of £200,000 affecting all components of the estate (Carbon Trust 2007c).

The Low Carbon Buildings Programme

Phase 2 of the Low Carbon Buildings Programme gives the opportunity to public sector organisations including local authorities, schools, hospitals, housing associations and charitable organisations, to receive grants for the supply and installation of specific micro-generation technologies at buildings located in the UK excluding the Isle of Man and Channel Islands. The level of funding for each grant is up to £1million and no more than three technologies can be installed per building. Each site might have more than one property. The public body can apply for funding of technologies for more than one site. Buildings need to meet the Buildings Regulations that applied at the time of construction or major refurbishment (dBERR 2007e)

Bio Energy Capital Grants Scheme – Rounds 3 and 4

This scheme supports the installation of biomass fuelled heat and CHP in England covering the sectors of industry, commerce and community. The community category includes local authorities as potential grant takers. The third round of the scheme was launched on 29th December 2006 and applications closed on 9th March 2007. The grant for the third round covers part of the cost of the heat or CHP equipments. The grant covers up to 40% of the cost difference from the conventional fossil fuel alternative. The minimum grant is £25,000 and the maximum single grant is £1million (Biomass Energy Centre 2007). The fourth round of the scheme has closed. If funding is

available, Defra will run a fifth round in autumn 2008, and further rounds are planned for 2009 and 2010 (Defra 2008j).

Energy Service Companies

An Energy Service Company or ESCo has the potential to bring a substantial saving in energy consumption and emissions at the local level. An ESCo agrees a contract with the client on the provision of energy services like heating, lighting, building services for a fixed period (typically seven years) against a set fee. The ESCo is responsible for specifying, financing, installing and running new equipment that will provide the services and reduce energy consumption. Thus, an ESCo has the incentive to reduce as much as possible the energy consumption as this will increase its profit. The client gets the benefit of enjoying modern energy systems without needing to invest or manage them. After the end of the contract the client takes the ownership of the equipment and enjoys savings in energy and lower fuel bills. This energy management approach of ESCo(s) helps overcome two major difficulties in energy efficiency in the domestic sector: firstly, the lack of finance for investment by poor households and secondly, the lack of expertise of many households to choose effective measures. Local authorities who are trusted by the public and have detailed knowledge of the people and housing in their areas can play such a role by becoming or helping establish ESCo(s) (LGA 2005). London ESCo is an example of an ESCo in cooperation with Local Government. In March 2006, the Mayor of London announced that the London Climate Change Agency (LCCA) selected EDF Energy plc as the winning bidder to set up a joint venture ESCo with responsibility to design, finance, build, own and operate decentralised energy projects for London for both new and existing development. London ESCo Ltd is a private limited company where the LCCA Ltd has 19% of the shareholding and EDF Energy the remaining 81%. LCCA Ltd is owned by LCCA which is a municipal company owned by the London Development Agency and chaired by the Mayor of London (London Climate Change Agency 2007).

Appendix 2: Local Energy Consumption Statistics in the UK

This appendix is presented to provide more detail on the methods of collection of local energy data and how they have changed from year to year. Such information reveals the inability to use data from all years to reliably monitor local carbon dioxide emissions.

Local gas and electricity consumption statistics

Local gas consumption statistics

Statistics for 2001 and 2002

Methodology

In June 2003, the results of a pilot exercise by DTI were published that converted gas consumption provided by National Grid Transco. This consumption that was referred to at postcode district level (full postcode less the last 4 digits or letters) was converted into gas consumption estimates at a local level for 2001 and 2002 (DTI 2003b). Later on NGT provided updated 2001 and 2002 postcode sector data. The postcode sector refers to the full postcode less the last two digits or letters (DTI 2003b). NGT used algorithms provided by the Office for National Statistics (ONS) and postcode sector consumption data were allocated to one or more LAU areas. These areas correspond to District or Unitary Authorities. LAUs include the 354 individual London Boroughs/Metropolitan Districts/Unitary Authorities/Local Authority Districts in England, the 22 individual Local Authorities in Wales, the 41 Unitary Authorities in Scotland and the 26 individual District Unitary Authorities in Northern Ireland giving a total of 443 UK LAUs. In cases where one postcode sector covered more than one LAU the consumption data were apportioned equally between the areas. Where for confidentiality reasons the Transco data set combines postcode sectors, the data is divided equally between the sectors when estimating LAU statistics. The data that are reported include gas distributed through the system of Transco thus the total consumption of the LAUs in 2001 and 2002 approximate nearly 70% of the total UK gas consumption as reported in the Digest of UK Energy Statistics 2003 (DTI 2003b).

Statistics for 2003 and 2004

Gas consumption statistics for 2003 (DTI 2004) and 2004 (DTI 2005) have been derived with the same methodology as the one described above.

Statistics for 2005

Introduction

A new method was used for the 2005 statistics. This method was used to produce revised figures for the 2004 statistics. The reason for this change in methodology was that following the restructuring of the gas distribution network in May 2005, some Local Distribution Zones became independent of NGT. Thus, NGT could not produce the postcode sector data for 2005. A new company was established on 1st May 2005 called Xoserve with remit to deliver transportation transactional services for the major network transportation companies (dBERR 2006a).

Methodology

The Annual Quantity data which gives the gas consumption for each gas meter, estimates annualized consumption. The method uses two meter readings at least 6 months apart with the last reading referring to the period from 1st April to 30 March each year. The data, apart from sites with daily meters, are weather corrected using normal weather conditions based on a 17 year average. Due to the different nature of the new methodology, figures cannot be compared with those of the previous methodology. The gas data are first allocated to Nomenclature of Units for Territorial Statistics (NUTS) areas using the National Statistics Postcode Directory (NSPD) of the Office for National Statistics and then the LAU code is derived. Whether the consumption is attributed to domestic or industrial users is based on the cut-off point of 73,200 kWh of consumption per year. Below this figure, consumption is attributed to the domestic sector. The result is that many small and medium size businesses are transferred to the domestic category and some large domestic users to the commercial/industrial sector (dBERR 2006a).

Statistics for 2006

Methodology

The same methodology as for the 2005 statistics was used for the 2006 gas consumption statistics (dBERR 2007a). The local gas statistics for 2005 and 2006 were updated on the 28th February 2008 and received National Statistics Status in March 2008 (dBERR 2008a). The 2005 data were produced in July 2007 when no local energy data had National Statistics Status. However, they received this Status in March 2008 without being revised because dBERR assessed that they were deemed already to be of sufficient statistical standards to be reclassified from experimental to National Statistics (Knight 2008).

Statistics for 2007

Methodology

The same methodology as for the 2006 statistics was used for the 2007 gas consumption statistics which has received the National Statistics Status (dBERR 2008a).

Local electricity consumption statistics

Statistics for 2003

Methodology

The methodology for collecting the 2003 electricity data was outlined in the second consultation exercise of DTI in 2004. It was decided that DTI would produce annualized data at local authority and NUTS1 Government Office regional level. This would include collecting data from electricity meters and aggregating at LAU level. Each metering point is associated with a unique reference number, the meter point administration number or MPAN. Each MPAN may have one or more meters. The data aggregators (DAs) are the agents of the electricity suppliers and collate the electricity consumption for each meter. Consumption data for each meter are held in the systems of DAs. Each MPAN has associated address and postcode information. This information can be found on the Gemserve CD-ROM. Gemserve is the company that helps suppliers obtain access to address and postcode information for each MPAN. DTI used the Office for National Statistics Postcode Lookup File that assigns meter postcodes first to NUTS areas and then to LAUs (DTI 2004). There are two types of meters: Non half-hourly (NHH) meters that refer to domestic and small commercial customers and half-hourly (HH) meters for large commercial consumers. DAs provided information for both NHH and HH meters for 2003 (DTI 2004). For NHH meters the DAs ran their system over the 2004 August Bank Holiday weekend to produce annualized consumption figures for the period from 30 January 2003 to 29 January 2004. DAs consumption data were based on either an annualized advance (AA) or an estimated annual consumption (EAC). Actual meter readings are used for the AA, while the EAC is an estimate of consumption based on historical information and profile class of the customer. There is a 14 month settlement period for the systems of DAs, which means that nearly 80 percent of data are based on AAs after 7 months and 92% after 14 months. In August 2004 data were generated by DTI which means that around 80% of NHH MPAN data were based on actual meter readings. For each NHH meter the profile attached was given with profiles 1 to 2 allocated to the domestic sector and profiles 3 to 8 to the

industrial and commercial sector. For HH meters DAs ran their systems to produce the amount of consumption (DTI 2004).

Statistics for 2004

Methodology

For 2004 statistics the Gemserve data was matched against the All Fields Postcode Directory (AFPD) to get a NUTS code and then a LAU code. The rationale for a new Directory was to better manage invalid, incomplete or missing postcodes. Automated methods were used in order to correct some invalid postcodes. For example, those starting with 1P to IP, those ending ll to LL and correcting the postcode spacing to standard arrangement (DTI 2005). Similarly to the 2003 statistics, any domestic consumption exceeding the threshold of 100,000kWh was allocated to the industrial and commercial sector. Very few domestic users were identified with consumption above 100,000 kWh, but a significant number between 50,000 kWh and 100,000 kWh. Some domestic consumers with consumption above 100,000 kWh have been classified in the commercial/industrial sector but this is more than counterbalanced by the number of small commercial/industrial consumers that are classified as domestic (DTI 2005).

Statistics for 2005 and 2006

Methodology

For the 2005 statistics the Meter Point Administration System has been replaced by a new on-line system, the so-called Electricity Central Online Enquiry Service (ECOES). The AFPD was replaced by the National Statistics Postcode Directory in May 2006 which was deemed to be more accurate (dBERR 2006b). For 2006 statistics, the February 2007 National Statistics Postcode Directory was used. If the third variable of the address included text that indicated a commercial address by containing the acronyms UNMET or UMS (unmetered supply), or STR (street lighting), or LAND or LLO (landlord supply), or STAIR (staircase lighting), or TEMP (temporary builder's supply) the consumption was transferred to the commercial/industrial category. In the 2006 dataset more text was searched including LTD, PLC, SHOP and HOTEL (dBERR 2007a). The local electricity statistics for 2005 and 2006 were updated on the 28th February 2008 and received National Statistics Status in March 2008 (dBERR 2008b).

Improvements to the data since 2003

Data quality since 2003 has been improved and some reasons are (dBERR 2006b, 2007a):

- The unallocated consumption fell from 6.5% in 2003 to 1.5% in 2004 but rose to 1.7 percent in 2005, falling then to 0.8% for the whole of Great Britain in 2006. The unallocated proportion of MPANs fell from 0.7% in 2003 to 0.15% in 2004 but rose to 0.2% in 2005 and fell to 0.1% in 2006.
- There were duplicated entry problems for the 2003 data. Although these problematic data were removed, it is considered that the resultant dataset did not comply strictly with the specifications used by other datasets in other regions. No such problems were present for the 2004 and 2005 data. For 2006 one DA provided duplicated entries but these were removed.
- The National Statistics Postcode Directory that allocated postcodes to LAUs in 2005 and 2006 is more reliable than the All Fields Postcode Directory that was used for 2004 data and the Postcode Address File software of 2003 data.
- In 2004 more non-domestic consumption has been transferred to the commercial/industrial category by identifying large non private use such as street lighting and communal areas consumption in multi-occupied dwellings and housing estates. This process was continued for 2005 and 2006 and in 2006 the words Ltd, plc, shop and hotel were identified in the address fields.
- For 2005, more of the larger half hourly consumers of electricity without enough postcode information were examined and these sites were allocated to an LAU area.
- The unallocated consumption has been less biased over the three years. To get to this conclusion the average domestic and commercial/industrial unallocated consumption is compared to the average consumption of all domestic and commercial/industrial consumers respectively. The figures show that the average unallocated domestic consumption was below 10.5% of the average domestic consumption of all users in 2003 but fell to 8% in 2004, 5% in 2005 and 2.5% in 2006**.** For the industrial and commercial sector the unallocated average consumption per MPAN in 2003 was almost 4 times higher than the average consumption for all industrial and commercial MPANs (because some very large users could not be allocated to a LAU). This difference rose in 2004, fell to nearly 1.5 times in 2005 but rose again to 3 times in 2006.

Statistics for 2007

Methodology

The same methodology as for 2006 was applied for the production of the local electricity statistics for 2007. The data has the National Statistics Status (DBERR 2008b).

Middle Layer Super Output Area electricity and gas consumption statistics

Introduction

DTI organized a seminar in 2005 where users of sub-national energy statistics agreed that it would be useful to produce even more disaggregated consumption data, below local authority level, at Middle Layer Super Output Area (MLSOA). The rationale was that monitoring of local energy strategies at this spatial level would be more meaningful and interventions more useful. This new geographical hierarchy of MLSOAs was first introduced in Census 2001. MLSOAs are expected to become the standard level at which National Statistics will be reported. MLSOAs are fairly consistent as far as population is concerned with minimum population being 5,000 including nearly 2,000 households. They are more static in relation to boundary changes and there is available geographical mapping software from the Office for National Statistics. These reasons give an advantage to reporting at MLSOA level (dBERR 2008c).

Datasets

A workbook has been produced for each Government Office Region in Excel files. These worksheets include information on the electricity and gas consumption allocation to local authorities' areas in England, Wales and Scotland. The data include electricity consumption for 2004 and gas and electricity consumption for 2005 and 2006. Scotland is excluded from the 2004 dataset (dBERR 2008c). Information on the 2004 dataset is provided in the next paragraph.

Data for 2004

These worksheets show electricity consumption data in England and Wales for 2004. In the first 7 rows of the worksheet, information for the whole local authority, taken from the December 2005 Energy Trends publication, is provided. This includes the total consumption, the number of meters and the average consumption for domestic and non-domestic users. The figures are given in kWh for the entire year. The total consumption of half hourly meters that refer to large industrial players is also given. This total consumption is not disaggregated below local authority level because doing so would break the National Statistics Code of Practice guidelines on data disclosure (dBERR 2008c).

Data from MLSOAs are aggregated at local authority level and produce information on total consumption, number of meters and average consumption for the following headings (dBERR 2008c):

- *Unmatched but allocated to local authority*: This figure is the consumption that could correctly be allocated to the local authority but not further to MLSOAs of that authority. The reason is that postcode information for some meters provided by Gemserve was incomplete, invalid or missing and further allocation to MLSOAs is not possible.
- *Domestic matched but transferred to commercial*: This figure includes consumption identified as domestic, but because it is above 50,000 kWh it is assumed that there is a greater possibility it is consumption of small commercial/industrial users. This reallocation process takes place only at local authority level (but not at MLSOA level).
- *Allocated to local authority but not to MLSOA*: This figure includes consumption that could be allocated to the correct local authority, but additional geographical information classifies this consumption to a MLSOA outside this correct local authority.
- *Total unallocated*: This is the sum of the above three unallocated consumptions.
- *MLSOA allocated*: This is the electricity consumption that has been allocated to the correct local authority and further down to MLSOAs in this local authority.

The remaining rows contain the breakdown of the consumption data for each MLSOA. The information refers to total consumption in kWh, number of meters and average consumption per meter for domestic standard, domestic economy 7 and non half hourly commercial electricity meters (dBERR 2008c).

Data quality issues

The 2004 dataset contains electricity data for England and Wales. The percentage of total domestic consumption that could be allocated to MLSOAs in most local authorities was very high reaching nearly 97.5%. In some exceptional cases this fell to as low as 40%. This is due to some electricity meters mainly in the North West of England having incomplete postcode information. Improvement on this difficulty has been achieved for the 2005 and 2006 data but there are still some areas with a relatively high unallocated proportion (dBERR 2008c).

MLSOA data for 2006 were produced in February 2008 and received National Statistics Status in March 2008 (dBERR 2008d). The 2005 data received this Status in March 2008 without being revised because dBERR assessed that they were deemed to already be of sufficient statistical standards when they were originally produced in July 2007 (Knight 2008). MLSOA data for 2007 of National Statistics Status were published in December 2008 with the same methodology applied for the 2006 data (DECC 2008).

Road transport energy consumption statistics

Statistics for 2002 and 2003

Methodology

The road transport data refer to energy consumption at the point of fuel use rather than where the fuel was purchased. This is because DTI wanted to produce estimates comparable to gas and electricity consumption that were already available. The methodology estimates consumption of fuel used in the UK. The body that was commissioned to produce the 2003 and 2004 estimates was Netcen (former name for AEA Technology) and these were available in June 2005 (dBERR 2007b). Netcen makes use of fuel consumption factors and traffic flow data to estimate road transport consumption. The transport vehicles are divided into 6 categories which are passenger cars, light goods vehicles (LGVs), rigid heavy good vehicles (HGVs), articulated HGVs, buses and coaches, and motorcycles. The vehicles are further divided according to fuel use (petrol and diesel). The fuel consumption factors are given in grams of fuel per kilometer and are estimated using two methods: Firstly, the Transport Research Laboratory (TRL) completes vehicle emission test data for various vehicle drives; secondly fuel factors are estimated from car manufacturer's data on CO_2 emissions. The traffic flow data are estimated from count points on major roads where an annual average daily flow is calculated for each vehicle type. This figure is multiplied by 365 to give the annual flow. For minor roads including B, C and unclassified roads, count points are not available and average flow data are taken from the Department for Transport (dBERR 2007b).

Statistics for 2004

Some changes in the methodology for the 2004 data are summarized as (dBERR 2007c):

- The latest traffic flow data have been used from the Department of Transport and Northern Ireland Traffic Service. Obsolete count points have been replaced and/or new traffic count points have been added. Around 141 local authorities have been affected by these changes in traffic count points.
- Vehicle flows on the M(6) toll were assumed for the 2002 and 2003 figures. For 2004, traffic count points were used and these were lower compared to proxy data of 2003.
- For 2004, fleet weighted consumption factors have been used from the NAEI Road Transport Database. These are updates of the fuel consumption factors used before.
- For minor roads, the fuel consumption has been estimated by scaling the 2003 figures with changes in total petrol and diesel consumption from the Digest of United Kingdom Energy Statistics 2005.
- For 2004, the LGVs split of fuel use has been updated and changed from 12% of petrol and 88% of diesel in 2003 to 10% and 90% respectively.

Statistics for 2005 and 2006

Similar methodology as for the 2004 figures was used for the 2005 estimates (dBERR 2007d). The data for 2005 & 2006 were issued in June 2008 with National Statistics Status (dBERR 2008e). These data were revised using the improved methodology of the 2007 data (see next section) and published in June 2009 (DECC 2009).

Statistics for 2007

Two major changes in the previous methodology were applied for the production of the 2007 data. Firstly, more detailed speed data were used and as a result the used fuel consumption factors were revised. A new database of speed data on various road types (motorways, major roads, etc.) and area types (Central London, Inner London, Urban, Rural, etc.) was produced to be compatible with the specifications used in the Department for Transport traffic census. Secondly, a more accurate fuel split between petrol and diesel cars was used. Until recently, there was no distinction between the petrol and diesel cars on the road thus data on the licensing status of the cars was used to determine the fuel split. However, recent data from the Department for Transport National Travel Survey has shown that diesel cars have an annual mileage

that is approximately 1.6 times greater compared to petrol cars. It is assumed that the additional diesel traveling is done on motorways and rural roads. Thus the different fuel split is dependent on the type of the road (DECC 2009).

Appendix 3: Provision of Expertise to Local Authorities through Energy Networks: The International Experience

Northrop M., (2003) supports that successful emissions reduction stories should be shared widely between municipalities and benefits arise for both parts of the relationship. This Appendix summarises international networks/mechanisms of cities, towns and municipalities in climate change mitigation and sustainable energy development.

The Cities for Climate Protection Campaign of ICLEI

The International Council for Local Environmental Initiative's (ICLEI) Cities for Climate Protection (CCP) campaign was launched in 1993 and since then the membership has grown significantly. The participating cities adopt energy policies and implement ways of quantifying greenhouse gas emissions at community scale. The requirement is the adoption of a five scale methodology to produce targeted greenhouse gas reductions, air quality improvements and better urban quality (Droege 2006) As of October 2008, nearly 800 Local Governments participate in the campaign in Europe, Australia, Canada, Japan, Latin America, Mexico, New Zealand, South Africa, South Asia, South-East Asia and the United States (ICLEI 2008c).

The framework of the campaign involves five milestones:

- creating an emissions inventory
- adopt emissions reduction targets
- developing an action plan
- implement the plan
- monitoring the results.

CCP is the most widely applied method of monitoring and reducing greenhouse gas emissions for Local Government (Droege 2006). National versions of the programme were launched in various countries including the UK. Before this national programme 11 UK authorities had participated in the CCP programme. Initial findings from the evaluation of their participation in CCP showed that the programme did not receive high attention within local authorities and active involvement across authorities was absent. CCP did not lead to new initiatives, rather than combining existing initiatives, thus in most cases the milestones of the programme were not achieved as envisaged. (Shackley, Fleming and Bulkeley 2002).

Energie Cites

Energie Cites with over 938 cities and organisations as members in 30 European countries is the association of European local authorities for the promotion of sustainable energy policies (Energie Cites 2008a). Local authorities themselves benefit from the expertise of Energie Cites in local energy strategies and are motivated to take action in energy efficiency and renewable energies (Energie Cites 2008b).

Covenant of Mayors in the EU

The Covenant of Mayors is a project of the European Commission where European cities will participate in a network to exchange and apply high-quality practice in sustainable energy development. The cities of the Covenant of Mayors will adopt a commitment to reduce their CO_2 emissions even further than the European Union's target of 20% by 2020 (Managenergy 2008a). As of 10th October 2008, 27 cities have joined the Covenant and 124 more have expressed interest in participating. No UK city has yet joined but London, Leicester, Manchester, Sheffield, Belfast, Leeds and Gateshead are willing to join (Managenergy 2008b). European cities could decide to join or not until the 15th of January 2009. The participating cities would have to produce a Sustainable Energy Action Plan (European Commission 2008).

Climate Alliance of European cities with indigenous Rainforest People/Allianza del Clima

The "Climate Alliance of European Cities with Indigenous Rainforest Peoples / Alianza del Clima" is Europe's largest city network dedicated to climate protection, with 1388 cities, municipalities and districts located in 17 European countries (Klimabuendnis 2008a). The association was founded in 1990 as a partnership between European cities and indigenous rainforest peoples. Members seek to reduce greenhouse gas emissions within a framework set by a voluntary commitment, notably in the fields of energy and transportation. Members are committed to halve per-capita emissions from a 1990 baseline by 2030 at the latest and over the long-term the goal is to reduce emissions to 2.5 tonnes per-capita annually (Klimabuendnis 2008b).

C40

C40, the former Large Cities Climate Leadership Group, is a group of world large cities aiming to reduce greenhouse gas emissions in their territory. In October 2005, representatives of 18 leading world cities gathered in London to discuss the issue of climate change. The representatives agreed to work together towards emissions

reductions. At the end of the meeting, a communiqué was signed which stated the need for cooperation and action by cities. The participating cities promised a number of actions with the most important the development of procurement strategies and collaboration to enhance the utilisation of climate friendly technologies. In August 2006, the Large Cities Climate Leadership Group formed a partnership with the Clinton Climate Initiative and was renamed as C40 (currently it consists of 40 cities) (C40 Cities 2008). London was inspired by Toronto to establish a caretaker service that helps homes in London become green as a result of its involvement in the C40 group. This service costs £199 per year and offers a dedicated energy trainer who undertakes a tailored audit of the property including a thermal image and a description of recommended measures to reduce emissions. A further option is the adoption of a yearly programme to reduce emissions with tailored advice on insulation, appliances, waste, saving water and even personal travel plans. Toronto delegates visited London to work with the London Climate Change Agency and set up a successful pilot scheme in Lewisham before extending the scheme to the entire London area. The Mayor of London stated that the service was subsidised and helped customers save money as this advice would cost around £2,000 to £3,000 directly from the market (Aldred 2007b).

European Green Cities Network

The European Green Cities Network has involved around 50 agencies and private companies of cities that work on pioneering urban housing, promoting and disseminating best practice and acting as a basis of stimulation for designers, investors, builders and Governmental officials. The main activities of the Network are conferences, technical training and information dissemination (Droege 2006).

International co-operation in the climate change strategy of Manchester

Manchester City Council has developed an ambitious plan to reduce carbon emissions on a city-wide scale. The plan has been developed and is to be delivered through international co-operation with Malmo and Skane (Sweden), Genoa (Italy), Murcia (Spain) and Thessaloniki (Greece). A partner from Poland is expected to join the effort. The plan envisages that the local authority will control all aspects of energy supply by 2020. A similar approach is found in Sweden where local authorities control the energy supply of cities. The plan also contains provisions for behavioural change for citizens and businesses. The annual CO_2 emissions for Manchester are currently over 3.5 million tonnes with a contribution of 47% from the commercial sector, 30% from the

domestic sector and 23% from the transport sector. Councillor Neil Swannick from Manchester City Council supports that deep emissions reductions cannot be achieved by a single sector or organisation. Instead, there is a need for combined responsibility. Manchester City Council has secured funding of £1 million for this strategy. Half of this is from the European Commission under the Intelligent Energy for Europe fund (Carter 2008).

Appendix 4: Template of Postal and Telephone Interview Questionnaires

BUILDING CAPACITY FOR A LOW-CARBON FUTURE

Peer Support Programme Evaluation

Postal Questionnaire for Mentor Authority

Dear participant,

We would be very grateful if you could print out the questionnaire, complete it and post it to:

Iraklis Argyriou
IESD
Queens Building
De Montfort University
The Gateway
LE1 9BH
Leicester

It should only take about 20 minutes to complete and your contribution is important to help UK local authorities move towards a low carbon economy.

If you require any further information or advice on this survey, please contact Prof. Paul Fleming at pfleming@dmu.ac.uk or Iraklis Argyriou at iargyriou@dmu.ac.uk

Contact details of person completing questionnaire

Name of your authority	
Your name	
Job title	
Department	
Telephone	
Fax	
E-mail	

Are you happy for your contact details to be placed on a database held by the Sustainable Energy Peer Support Programme in order to share information and provide support?

Yes O 1
No O 2

SECTION 1: GENERAL QUESTIONS

1 Have you read the toolkit in detail?

Yes O 1
Most of it O 2
Part of it O 3
*which Parts?*_____

No O 4

2 How much time did you spend reading the toolkit?

Less than 2 hours O 1
Between 2 to 3 hours O 2
More than 3 hours O 3

3 How easy was the toolkit to understand?

Very easy	Moderately easy	Not very easy	Not at all	Unsure
O 1	O 2	O 3	O 4	O 5

4 Please list any suggestions for making the toolkit easier to understand:

5 How relevant is the toolkit to your authority?

Very relevant	Moderately relevant	Not very relevant	Not at all	Unsure
O 1	O 2	O 3	O 4	O 5

6 How useful was the Interactive CD format for the toolkit?

Very useful	Moderately useful	Not very useful	Not at all	Unsure
O 1	O 2	O 3	O 4	O 5

7 Please list any further comments on the usefulness of the interactive CD format:

SECTION 2: CONTENT

8 How useful were the **self assessment questions** of the toolkit checklists in helping you to guide the mentee authorities?

Very useful	Moderately useful	Not very useful	Not at all	Unsure
O 1	O 2	O 3	O 4	O 5

9 How useful were the ***beacon resources*** in helping you to guide the mentee authorities?

Very useful	Moderately useful	Not very useful	Not at all	Unsure
O 1	O 2	O 3	O 4	O 5

10 How useful were the ***case studies*** in helping you to guide the mentee authorities?

Very useful	Moderately useful	Not very useful	Not at all	Unsure
O 1	O 2	O 3	O 4	O 5

11 How useful was the ***On Target Diagram*** in helping you to guide the mentee authorities?

Very useful	Moderately useful	Not very useful	Not at all	Unsure
O 1	O 2	O 3	O 4	O 5

Recommendations on the content of the toolkit

12 Please list any recommendations that you may have for the content of the toolkit:

SECTION 3: PROCESS

13 Did you use the toolkit with the mentee authorities?

Yes	O 1
No	O 2

14 How prepared did you feel for using the toolkit with the mentee authorities?

Very prepared	Moderately prepared	Not very prepared	Not at all	Unsure
O 1	O 2	O 3	O 4	O 5

15 Was the mentoring exercise a success?

Yes	O 1
No	O 2

Please specify why:

Recommendations on the mentoring process

16	Please list any recommendations that you may have for the mentoring process:

SECTION 4: ADDITIONAL QUESTIONS

First response to the toolkit

17. When you first received your toolkit, what did you do with it?

Read all of it (only one to receive toolkit)	O 1
Read all of it (as part of team to receive a toolkit)	O 2
Read part of it (only person to receive toolkit)	O 3
Read part of it (as part of team, we each read a different part)	O 4
Other (please specify):	

Toolkit implementation

18	Did you feel there were any barriers or issues in preventing you from progressing with the toolkit?	
	Yes	O 1 go to questions 19 & 20
	No	O 2 go to question 21

19 Please list the barriers or issues that prevented you from progressing with the toolkit:

20 How were these barriers or issues overcome?

Support for the toolkit

21 Did you feel there was support in your team to act upon the toolkit?

Yes O 1
No O 2

Other resources

22 Were there any other resources that you felt were needed, but not included in the toolkit?

Yes O 1
No O 2

23	Please list the resources that you feel were needed but not included:

Outcomes from using the toolkit

The benchmarking exercise gives you the opportunity to identify elements of the sustainable energy agenda that can be improved. In the tables below, please list all of the elements of the benchmark (e.g. 1.11 Vision/Strategic approach to energy, 1.12 Management Systems/Decision making etc) which you have examined as a result of using the toolkit, and provide details of the actions which may have resulted from this. Please add each element of the benchmark which you have addressed in a separate table (*there are 10 separate questions/tables so that up to 10 elements can be addressed*, *however, only one table is provided in this Appendix to save space*):

24	Which element of the benchmark was addressed as a result of using the toolkit? (please provide the code number and title):
	Did this result in any actions or planned actions (if yes, please list below)? Yes O 1 No O 2

Actions	Implemented	Plan to implement in the near future (1 to 2 years)
1.	O 1	O 4
2.	O 2	O 5
3.	O 3	O 6

	How useful was the toolkit in developing these actions? Very useful O 1 Moderately useful O 2 Not very useful O 3 Not at all O 4 Unsure O 5
	Please list any recommendations for making the toolkit more useful in addressing this element of the benchmark?

Measuring progress

34	Please explain how do you measure the progress of your energy policies:

Thank you for completing the questionnaire

BUILDING CAPACITY FOR A LOW-CARBON FUTURE

Peer Support Programme Evaluation

Postal Questionnaire for Mentee Authority (only questions different from those of postal questionnaires for mentor and stand-alone authorities are given)

SECTION 2: CONTENT

8 How useful were the ***self assessment questions*** of the toolkit checklists when using the toolkit?

Very useful	Moderately useful	Not very useful	Not at all	Unsure
O 1	O 2	O 3	O 4	O 5

9 How useful were the ***beacon resources*** when using the toolkit?

Very useful	Moderately useful	Not very useful	Not at all	Unsure
O 1	O 2	O 3	O 4	O 5

10 How useful were the ***case studies*** when using the toolkit?

Very useful	Moderately useful	Not very useful	Not at all	Unsure
O 1	O 2	O 3	O 4	O 5

11 How useful was the ***On Target Diagram*** when using the toolkit?

Very useful	Moderately useful	Not very useful	Not at all	Unsure
O 1	O 2	O 3	O 4	O 5

SECTION 3: PROCESS

13 Did the mentor authority explain the toolkit to you in detail?

Yes	O 1
No	O 2

14 How comprehensive was the guidance from the mentor authority during the mentoring process?

Very much	Moderate	Not very much	Not at all	Unsure
O 1	O 2	O 3	O 4	O 5

SECTION 4: ADDITIONAL QUESTIONS

18	Did you get help from your mentor authority on how to first approach the toolkit?

Yes O 1
No O 2

Contribution of the toolkit in development of action plan and implementation

19	How much did the toolkit and mentoring contribute to the development of an action plan?

Very much O 1 | Moderately O 2 | Not very much O 3 | Not at all O 4 | Unsure O 5

20	How much did the toolkit and mentoring contribute to the implementation of an action plan?

Very much O 1 | Moderately O 2 | Not very much O 3 | Not at all O 4 | Unsure O 5

Measuring progress

37	Please explain how do you intend to measure the progress of your action plan prepared as part of the Peer Support mentoring process (if you have developed one):

Thank you for completing the questionnaire

BUILDING CAPACITY FOR A LOW-CARBON FUTURE

Peer Support Programme Evaluation

Postal Questionnaire for Stand-Alone Authority (only questions different from those of postal questionnaires for mentor and mentee authorities are given)

3. PROCESS

13 How clear was the process without external support?

Very clear	Moderately clear	Not very clear	Not at all	Unsure
O 1	O 2	O 3	O 4	O 5

Mentoring guidance

14 Did you receive any support from a mentor authority?

Yes	O
No	O

If yes, what kind of support?

Sample of telephone interview with a mentor authority

03 May 2007

Warm-up questions

1. How many officers and members participated and read the toolkit?

2. Did they find the toolkit useful?

3. Are you satisfied from the format and presentation of the toolkit? Is anything missing?

4. Which, if any, elements of the benchmarking matrix did you find inappropriate and why?

The impact of the toolkit

5. Did you find the toolkit helpful in raising the profile of energy and climate change within your authority? If yes, in what way?

6. Have you changed your energy policy or the way you approach energy as a result of participating in the mentoring?

7. How does the toolkit help you implement energy policy as an estate manager?

8. How does the toolkit help you implement energy policy as a service provider?

9. How does the toolkit help you implement energy policy as a community leader?

***Question on the monitoring of greenhouse gas emissions and the* +10 % on-site renewables target**

10. Do you estimate greenhouse gas emissions at internal and community level? Please explain

11. Do you have the target of +10 % on-site renewables or a more ambitious one?

Peer support process

12. What would you have liked to have been done differently, if anything, in the mentoring scheme?

Sample of telephone interview with a mentee authority

05 May 2007

(only questions different from those of postal questionnaires for mentor authorities are given)

13. Which aspects of the mentoring exercise were the most beneficial for your authority?

14. Which are the main barriers that you anticipate to face in the application of the toolkit in your authority and how do you anticipate overcoming these?

15. How do you intend to transfer the knowledge and experience that you have gained from the toolkit to your staff?

16. Would you like to stay in close contact with other councils on climate policy in the near future?

The questions that were asked to the stand alone authorities were those used for mentee authorities apart from the first one of the above four (additional) questions.